The Journal of Pediatrics

VOL. 5 JULY, 1934 NO. 1

Original Communications

AN ANALYSIS OF 88 CASES OF POLIOMYELITIS TREATED IN THE DRINKER RESPIRATOR, WITH A CONTROL SERIES OF 68 CASES

I. CLINICAL STUDIES IN POLIOMYELITIS

JOHN FITCH LANDON, M.D.
NEW YORK, N. Y.

FOREWORD

THE first four of the following studies are part of a committee report of the poliomyelitis epidemic in New York City in 1931. A committee of the Department of Hospitals, under the chairmanship of Dr. Philip Van Ingen, was appointed to study the cases treated in the various city communicable disease hospitals. Full statistical tables will be published in the complete report and hence are omitted in these papers.

In 1931, 4,138 cases of poliomyelitis were reported to the New York City Department of Health. Approximately two-thirds of the cases were admitted to the contagious units of the New York Department of Hospitals and were distributed as follows:

Kingston Avenue Hospital	1,143 cases
Willard Parker Hospital	1,014 cases
Queensboro Hospital	369 cases
Richmond Borough Hospital	105 cases
Riverside Hospital	89 cases
	2,720 cases

The hospital charts which have supplied the basic material for this report have been found to be surprisingly complete and accurate, considering the tremendous tension under which the personnel of the hospitals labored during the peak of the epidemic. The essential data were transcribed from these charts onto two especially prepared forms—one for the patient admitted in the preparalytic stage of the disease, and the other for the case frankly paralyzed on admission. The entire work of the transference of the data was carried out by physicians, either members of the visiting staffs, residents or internes of the various hospitals. In most instances these physicians had personally observed the cases which they transcribed.

From a study of the original records it was early apparent that a number of the cases accepted by the Board of Health as authentic instances of poliomyelitis were, under critical inspection, distinctly questionable. These "doubtful" cases were for the most part, so-called "preparalytic" patients in whom no paralysis developed during their stay in the hospital, and who were labeled as definite poliomyelitis by the Health Department because the spinal fluid count was over 10 cells, the maximum count accepted by them as being within normal limits. In many of these cases very low counts, 12 to 20 cells, were present with very little if any clinical evidence suggesting the disease. Although quarantine of suspected cases is thoroughly justified in epidemic times, the committee eliminated as many as possible of these questionable cases for the final analysis, since there is considerable evidence that a moderate pleocytosis may occur in acute infections not definitely associated with the central nervous system.

Consequently rigid criteria were established concerning the cell count. Any preparalytic case in which the cells in the spinal fluid numbered under 50 was rejected as a bona fide case unless substantiated by a convincing history and positive physical findings, in which event a maximum of 25 cells was allowed. Further, a number of cases of infants and young children having questionable paralysis on admission, or developing doubtful paralysis during their stay in the hospital, were rejected due to the admitted difficulty of definitely determining a slight paresis in a very young child, and because of the notorious unreliability of the reflexes in the very young.

As a result of the establishment of these standards, 318 records were eliminated from the 2,720 officially accepted cases, leaving a total of 2,402 cases which form the basis of these studies.

DURING the summer of 1931 eighty-eight cases of poliomyelitis with respiratory difficulty were treated in the Drinker respirator in four communicable disease hospitals of the New York Department of Hospitals. Of these, forty-seven were admitted to Willard Parker Hospital, twenty-seven to Kingston Avenue Hospital, ten to Queensboro Hospital, and four to Richmond Borough Hospital.

Due to the insufficient number of respirators in these hospitals, a considerable number of cases with respiratory embarrassment, in which the use of the respirator was indicated, were not so treated. Consequently, an opportunity was afforded to compare these cases with those receiving respirator care. The total number in this control group was sixty-eight, of which twenty-five were patients in the Willard Parker Hospital, twenty-seven in Kingston Avenue Hospital, thirteen in Queensboro Hospital and three in Richmond Borough Hospital. This study represents the largest selection of cases treated in the respirator heretofore compiled, and is further the first compilation of data dealing with the respirator-treated cases in which any comparable control group has been attempted. For the most part cases treated in the respirator received no other mode of therapy except symptomatic treatment. (In one fatal case human convalescent serum was injected intraspinally, and three cases were treated with ephedrine sulphate intraspinally, one resulting in death.) In the control series only cases which received purely

symptomatic treatment were included. Cases receiving ephedrine sulphate or serum of any type, were omitted from this control series.

In analyzing both the respirator and the control series the necessity for grouping cases according to the degree of severity was recognized. Cases therefore were estimated by one observer as moribund, severe, and moderate. In the respirator group the degree of severity (moribund, severe, moderate) was estimated from the symptoms at the time the patient was first placed in the respirator. In the control group the degree of severity was estimated at the time the respiratory embarrassment was first noted. The respirator cases are therefore recorded at their worst while controls frequently went on to more serious involvement, although not so classified.

The great majority of cases receiving respirator care had either intercostal or diaphragmatic paralysis or both—only four cases being without intercostal or diaphragmatic involvement. In the control series there were eight cases without either intercostal or diaphragmatic involvement. A considerable number of the cases having intercostal or diaphragmatic paralysis gave some evidence also of bulbar involvement; thus in the respirator-treated group there were twenty-eight cases showing bulbar involvement in addition to paralysis of the intercostals or diaphragm or both. In the control group, there were thirty-seven such cases. This leaves fifty-six respirator-treated cases having only involvement of the intercostals or diaphragm or both (purely spinal type). In the control group, there remain twenty-three such cases of the purely spinal type.

ANALYSIS OF RESULTS (TABLE I)

A. By degree of severity:

Of the eighty-eight cases treated in the respirator, irrespective of type or severity of the paralysis, fifty-three died in the hospital, a mortality rate of 60.2 per cent. Excluding moribund cases, seventy-seven cases were treated, forty-two of whom died in the hospital, a mortality rate of 54.5 per cent. Of these cases there were sixty-three graded as severe, with thirty-nine deaths, a mortality of 61.9 per cent; and fourteen cases graded as moderate with three deaths, a mortality rate of 21.4 per cent.

In the control series there were sixty-eight cases, irrespective of type or severity. Of these, forty patients died in the hospital, a mortality rate of 58.8 per cent. Excluding the moribund cases in this group, there were fifty-four cases with twenty-seven deaths, a mortality of 50.0 per cent. Of these, forty-three were graded as severe, with twenty-seven deaths, a mortality of 62.8 per cent; and eleven as moderate with no deaths.

TABLE I

ANALYSIS OF CASES TREATED IN RESPIRATOR AND CONTROL CASES

RESPIRATOR CASES	TOTAL	DISCHARGED		DIED	MORTALITY PERCENTAGE	FOLLOW-UP 18 MONTHS AFTER DISCHARGE				FINAL MORTALITY
		PARALYZED	NOT PARALYZED			CURED	IMPROVED	UNIMPROVED	DIED	
Number of Cases	88	34	1	53	60.2	1	15	3	16	78.4
Age Distribution										
Under 3 yr.	8	1		7	87.4		1			87.4
3 to 5 yr.	26	11	1	14	53.8	1	3		8	84.6
6 to 10 yr.	25	10		15	60.0		7		3	72.0
11 to 15 yr.	17	11		6	35.3		4	2	5	64.7
16 to 21 yr.	6	1		5	83.3			1		83.3
Over 21 yr.	6			6	100.0					100.0
Condition When Placed in Respirator										
Moribund	11			11	100.0					100.0
Severe	63	23	1	39	61.9	1	9	3	11	79.3
Moderate	14	11		3	21.4		6		5	57.1
CONTROL CASES										
Number of Cases	68	27	1	40	58.8	7	13	5	3	63.2
Age Distribution										
Under 3 yr.	15	5	1	9	60.0	2	3		1	66.6
3 to 5 yr.	24	15		9	37.5	4	7	3	1	41.7
6 to 10 yr.	20	5		15	75.0		3	1	1	80.0
11 to 15 yr.	7	2		5	71.4	1		1		71.4
16 to 21 yr.	1			1	100.0					100.0
Over 21 yr.	1			1	100.0					100.0
General Condition at Onset of Respiratory Symptoms										
Moribund	14		1	13	92.8	1				92.8
Severe	43	16		27	62.8	2	9	4	1	65.1
Moderate	11	11				4	4	1	2	18.2

B. By type of paralysis:

Table II shows the distribution of the paralysis in the two groups and the mortality.

TABLE II

	RESPIRATOR-TREATED			CONTROLS		
	CASES	DIED	MORTALITY	CASES	DIED	MORTALITY
Intercostal or Diaphragmatic Involvement (Purely Spinal)	56	29	51.7	23	7	30.4
Intercostal or Diaphragmatic and Bulbar Involvement	28	20	71.4	37	26	70.2
Purely Bulbar (Pharyngeal Only)	2	2	100.0	–	–	–
Bulbar and Spinal (No Intercostal or Diaphragmatic Involvement)	2	2	100.0	8	7	87.5
Total	88	53	60.2	68	40	58.8

C. By duration of illness before death:

By the sixth day of illness, 35 or 66 per cent of the patients of the fifty-three fatal cases treated in the respirator, and 26 or 65.0 per cent of the patients of the control cases had died. This would indicate that if a patient with respiratory paralysis has not died before the sixth day of the disease, his chances of recovery, irrespective of whether or not the respirator is used, are appreciably better.

FOLLOW-UP EIGHTEEN MONTHS LATER

Even more suggestive are the results in both groups at the end of eighteen months (Table I). Of the thirty-five patients treated in the respirator and discharged from the hospital able to breathe without difficulty and without artificial aid, sixteen, or 45.7 per cent, had died, practically all of them from respiratory infections, chiefly pneumonia. These additional deaths bring the final mortality of the respirator-treated cases to the appalling figure of 78.4 per cent. (If we exclude eleven moribund cases, the total final mortality is 75.3 per cent.) On the other hand, when these figures are compared with the control group, it will be found that of twenty-eight cases discharged from the hospital breathing spontaneously, only three had died (mortality rate of 10.7 per cent), bringing the final mortality rate of the control group to 63.2 per cent.

DISCUSSION

Published information concerning the late results of patients treated in the Drinker Respirator is meager. Wilson,[1] working at the Children's Hospital in Boston, had only three deaths in twenty-three spinal cases given respirator treatment, a mortality of 13 per cent, and Wesselhoeft and Smith,[2] working at the Boston City Hospital, had no deaths in nine cases. The very great discrepancy between these results and those of the New York Communicable Disease Hospitals above described (56 cases with 29 deaths, mortality 51.7 per cent) may possibly be explained by the fact that a limited number of respirators were available in New York hospitals during the 1931 epidemic, and consequently only those patients urgently in need of the machine were so treated, whereas the above observers employed the respirator early in many cases with only slight respiratory embarrassment. The control series cited above suggest that many of their mild cases might have recovered without the use of the respirator. During the 1931 New York City epidemic, it was observed that a considerable number of mild or moderate cases with respiratory embarrassment recovered without the use of the apparatus. The analysis of the control series further indicates that even in the severe degrees of respiratory paralysis there is a one to three chance of the patient recovering spontaneously without the aid of the respirator.

Although Wilson[3] has reported fairly favorable results in the use of the respirator in bulbar cases (of twenty-three cases so treated, ten recovered), the results from our own study indicate that the respirator is of no value in the bulbar type of case. This opinion is corroborated by Shaw and his associates,[4] who treated five patients with bulbar cases, all of whom died. Furthermore, Wesselhoeft and Smith, in reporting thirty cases treated for respiratory failure in Drinker respirators, saved only one of five bulbar cases, three out of nine mixed cases of descending variety and none of the ascending type (7 cases).

It is clearly recognized that this unfavorable report will be subject to two major criticisms. The first criticism will be that the machines were not properly used. The various details concerning the handling of the machine do not come within the scope of this report. However, possible misuse of the machine is recognized as a controversial contributory factor in the unfavorable results of the cases treated in the New York Communicable Disease Hospitals. For example, there was great difficulty in keeping the machine cooled and in preserving a constant temperature. This partial failure of the cooling apparatus to function properly was noted not only by us but by several other observers. It has been suggested that insolation (heat prostration) may have been a contributory factor in the deaths of some of the patients. Second, it is entirely possible that the rate of the machine did not correspond in some cases with the optimum respiratory rate of the patient. Further, the amount of negative pressure to be employed is still a matter of dispute. It is possible that the recommended pressure of 20 mm. of water pressure is too great for very young patients suffering from respiratory distress. The resultant hyperventilation and alkalosis may, therefore, have been an additional contributory cause. It must also be emphasized that it is no easy matter in some cases to determine whether the respiratory distress is due to involvement of the ninth and tenth nerves, the vital centers, the intercostals, or the diaphragm. Moreover, the indications for placing the patient in and removing him from the respirator are not always clear-cut. In short, in a disease as variable in its respiratory manifestations as poliomyelitis, it is impossible to be dogmatic in setting up too rigid criteria. The final decision is a matter of personal judgment, with an inevitable percentage of error due to the human factor. Nevertheless, the uniformity of the mortality rate in the four hospitals is remarkable when one remembers that the machines were used at the various institutions by entirely separate staffs so that the details of technic were different. This would indicate that if the machines were improperly employed, the error must have been fairly constant. Doubtless, the second criticism which will be advanced is that more seriously ill cases were treated in the respirator. While not deny-

ing the natural inclination to rush a patient with severe respiratory embarrassment to the respirator, it must be reiterated that the limited number of respirators available rendered it inevitable that a certain number of severe cases could not be so treated. The results of the treatment of those seriously ill patients not placed in the respirator compare favorably with those treated in the machine.

The outstanding feature of this report is the great discrepancy existing between the respirator-treated and the control groups in the eighteen months' follow-up. Although the mortality rate of patients dying in the hospital is essentially the same in the two groups, at the end of eighteen months nearly five times as many deaths had occurred among these patients treated in the respirator and discharged from the hospital able to breathe spontaneously as in the similar control group.

The pulmonary pathology in the respirator-treated cases is also significant. This consists in emphysema, pneumonia, and atelectasis. These findings occur also, of course, in cases with respiratory paralysis not treated in the respirator, *but not to as marked a degree.*

To quote from Dr. Laurence W. Smith's summary of the analysis of pathologic findings of cases treated in the respirator: "In cases which have been in the respirator, as a rule, more marked mechanical changes are noted. We have observed in every such case coming to autopsy (numbering eighteen) that a very marked alveolar emphysema has been present. We feel that this is mechanical in origin, due in part to the involuntary expansion of the lung in the respiratory chamber. Grossly these lungs are readily recognizable. They are usually voluminous due to the distention of their alveoli, but at the same time they have lost their normal elasticity. This is apparently ascribable to a sustained stretching of the elastic tissue fibers of the alveolar walls to the point where many of these fibers are torn, as may be demonstrated microscopically in suitably stained specimens. This picture is not uniformly seen throughout the lung, but it is present in varying degree in different areas. It is always most marked in the anterior portion of the upper lobes, as might be expected. We feel that this picture is of more than passing interest; as it will be noted elsewhere, since by the end of an eighteen-month period after the onset of the infection almost 80 per cent of the cases treated in this manner have died of a respiratory infection. This finding seems perhaps significant as one factor in reducing the resistance of the lung to subsequent infection. . . . From our observations of the degree of pulmonary damage found in the autopsied cases, we feel that while the respirator may be the most important single therapeutic agent in conserving life in the relatively small, carefully selected group of cases suffering from intercostal and diaphragmatic paralysis, its general use in cases showing bulbar paralysis is not indicated. With improvement in the mechanical details of the machine,

particularly in respect to the rate and volume of the artificial respiration and its heat control, we feel that such lesions as we have encountered should not develop, and which we cannot feel but played a definite part of the mortality figures of this group."

SUMMARY

1. Eighty-eight cases of poliomyelitis with respiratory distress, treated in the Drinker respirator are compared with sixty-eight cases of patients suffering from respiratory embarrassment in which the machine could not be employed because of the scarcity of respirators.

2. The respirator-treated cases and control cases are analyzed according to the degree of severity and by type of paralysis. No appreciable difference in the mortality of the patients dying in the hospital in the two groups is noted.

3. Of the cases treated in the respirator and discharged from the hospital able to breathe spontaneously, nearly five times as many were dead at the end of eighteen months as in the comparable control group.

4. The combined clinical and pathologic findings strongly suggest that the respirator as employed in 1931 by the communicable disease hospitals may predispose the pulmonary apparatus to subsequent infection or collapse.

REFERENCES

1. Wilson, J. L.: New England J. Med. **205**: 597, 1931.
2. Wesselhoeft, C., and Smith, E. C.: New England J. Med. **207**: 559, 1932.
3. Wilson, J. L.: New England J. Med. **206**: 887, 1932.
4. Shaw, E. B., Thelander, H. E., and Limper, M. A.: California and West. Med. **35**: 5, 1931.

SERUM THERAPY IN PREPARALYTIC POLIOMYELITIS

II. Clinical Studies in Poliomyelitis

John Fitch Landon, M.D.
New York, N. Y.

AMONG the 597 preparalytic cases accepted for this study, 118, or 19.76 per cent received convalescent serum; 73 cases, or 12.23 per cent, were treated with horse serum and 396, or 66.33 per cent, received no serum treatment. The proportions in each group are shown as (1) those who were paralyzed and recovered, (2) those who were never paralyzed, (3) those who were paralyzed at time of discharge, and (4) those who died (Table I). There is no striking difference in the various groups, except in the deaths; those treated with convalescent serum had a mortality rate of 5.93 per cent; those treated with horse serum, 8.22 per cent; while in the untreated cases, only 3.03 per cent died.*

One hundred cases admitted to the communicable disease hospitals as preparalytic poliomyelitis were not accepted for analysis because of insufficient data to make a diagnosis. Of these doubtful preparalytic cases, seventeen were given serum (thirteen cases convalescent serum and four horse serum). The remaining eighty-three cases received no serum.

Table I

Serum Cases Among 597 Preparalytic Cases

	(1) Paralyzed and Recovered		(2) Never Paralyzed		(3) Paralyzed		(4) Died		Total
	No.	Per-centage	No.	Per-centage	No.	Per-centage	No.	Per-centage	No.
Human Convalescent	5	4.23	77	65.25	29	24.57	7	5.93	118
Horse Serum	2	2.74	46	63.01	19	26.03	6	8.22	73
Transfusions	0		4	66.66	2	33.33	0		6
Normal Human Serum	0		3	75.00	1	25.00	0		4
All Serum Cases	7	3.48	130	64.67	51	25.37	13	6.46	201
No Serum	16	4.04	266	67.17	102	25.75	12	3.03	396
All Cases	23	3.85	396	66.33	153	25.62	25	4.18	597

Comparability of Treated and Untreated Groups

It is extremely important to attempt to ascertain whether the two groups (treated and untreated) are sufficiently comparable to admit the drawing of any valid conclusions. The most scientific method of

*A few patients were treated with whole blood transfusion or with normal human serum. The number of these cases is too small to justify any analysis. Their inclusion, however, does not materially affect the results obtained with the convalescent serum: paralyzed and recovered 3.9 per cent; never paralyzed 65.6 per cent; paralyzed 25.0 per cent; died 5.4 per cent.

studying the effect of any mode of so-called specific treatment is to treat strictly alternate cases of the disease, i. e., employing only symptomatic therapy in every other case admitted to the hospital, regardless of age, severity, or any other factor. Only in this way, and only if the total number of cases is sufficiently large, can any truly accurate facts be obtained.

The single fact that in this series of cases about twice as many cases received symptomatic treatment alone as those treated either with convalescent or horse serum, indicates definitely that no strictly alternate series was run.

Further, it must be generally admitted that the unconscious tendency is usually to select the more seriously ill patient for specific treatment, especially if it is believed that the specific agent will save life. Was this the case in the present analysis?

Three possible objective evidences of the severity of the disease present themselves: (1) character of onset, i.e., sudden or gradual; (2) degree of prostration; and (3) temperature on admission.

A consideration of the cases treated with convalescent serum indicates that the onset (Table II) was sudden in 68.64 per cent and in 27.96 per cent the onset was gradual. In the cases treated with horse serum, onset was sudden in 72.60 per cent and gradual in 19.17 per cent.

TABLE II

ONSET

	SUDDEN		GRADUAL		NOT STATED		TOTAL NO.
	NO.	PER-CENTAGE	NO.	PER-CENTAGE	NO.	PER-CENTAGE	
Human Convalescent	81	68.64	33	27.96	4	3.39	118
Horse Serum	53	72.60	14	19.17	6	8.22	73
No Serum	248	62.62	131	33.08	17	4.29	396
All Cases	388	64.99	182	30.48	27	4.52	597

When the above figures are compared with the cases receiving no serum, it is found that 62.62 per cent had a sudden onset and 33.00 per cent gradual. Therefore, if the character of onset is any measure of the severity of the disease, the cases treated with serum, both human and horse, were more severe.

Likewise, when the cases treated with convalescent serum are considered, it is found that 30.50 per cent were admitted showing marked prostration (Table III); in 41.52 per cent the prostration was slight.

In cases treated with horse serum 39.52 per cent showed marked prostration and 27.40 per cent slight. Of the cases not receiving serum therapy, prostration was marked in 21.97 per cent and slight in 46.46 per cent.*

*The large proportion of cases where the condition is not stated is nearly the same in all three groups. Thus if the degree of prostration as noted indicates the severity of the disease, the serum treated cases were more severe than the untreated.

TABLE III

PROSTRATION

	MARKED		SLIGHT		NOT STATED		TOTAL NO.
	NO.	PER-CENTAGE	NO.	PER-CENTAGE	NO.	PER-CENTAGE	
Human Convalescent	36	30.50	49	41.52	33	27.96	118
Horse Serum	29	39.52	20	27.40	24	32.87	73
No Serum	87	21.97	184	46.46	125	31.56	396
All Cases	153	25.62	255	42.71	189	31.66	597

Lastly, in the cases treated with convalescent serum the temperature (Table IV) was recorded as 102° F. or over in 33.90 per cent of the cases; in 65.25 per cent the temperature was under 102° F. In the horse serum cases 35.61 per cent had temperatures of 102° F. or over; in

TABLE IV

TEMPERATURE ON ADMISSION

	102° F. OR OVER		UNDER 102° F.		NOT STATED		TOTAL NO.
	NO.	PER-CENTAGE	NO.	PER-CENTAGE	NO.	PER-CENTAGE	
Human Convalescent	40	33.90	77	65.25	1	0.84	118
Horse Serum	26	35.61	46	63.01	1	1.37	73
No Serum	84	21.21	311	78.53	1	0.25	396
All Cases	157	26.30	437	73.20	3	0.50	597

63.01 per cent the temperature was under 102° F. In the group not treated with serum, only 21.21 per cent had a temperature of 102° F. or over, while in 78.53 per cent the temperature was under 102° F.

Therefore, if the degree of temperature on admission to the hospital is any indication of the severity of the cases, the serum-treated cases were more severe than those receiving no serum.

There are a number of other interesting and somewhat suggestive facts to be obtained from the cases under consideration. These will be briefly considered as follows:

Day of Illness Serum Was Administered (Table V).—Consideration of the day of illness patients received serum, shows that by far the largest number (35.6 per cent) were treated on the second day. Out of a total of 118 cases receiving convalescent serum forty-six or 38.9 per cent, received it on the second day; the remaining seventy-two cases, or 61 per cent, varying from the first to the tenth day. In the cases receiving horse serum (seventy-three cases) twenty-two were treated on the second day, and twenty-three on the third day (total incidence, 61.6 per cent). The fact that the greatest number of cases received "specific" therapy early in the disease (70.1 per cent by the third day) obviates the frequently advanced criticism that preparalytic poliomyelitis patients do not receive serum sufficiently early.

Day of Illness Paralysis Appeared.—In cases treated with convalescent serum, subsequent paralysis appeared most frequently on the fifth day of illness; in the horse serum treated group on the fourth day followed closely by the sixth day; and in the cases receiving no serum on the third and fourth days, although in nearly an equal number paralysis occurred on the fifth, sixth, and seventh days. No conclusions can therefore be drawn from a consideration of the day of illness on which paralysis developed.

TABLE V

DAY OF ILLNESS CONVALESCENT SERUM WAS GIVEN AND RESULTS

DAY OF ILLNESS SERUM GIVEN	1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	TOTAL
PERCENTAGE OF CASES	6.7	38.9	24.5	11.0	5.0	5.0	4.2	1.6	0.8	1.6	100
NUMBER OF CASES	8	46	29	13	6	6	5	2	1	2	118
Paralyzed and Recovered	1	1		1	2						5
Paralyzed	1	11	12	1			2	2			29
Never Paralyzed	5	32	15	11	2	6	3		1	2	77
Died	1	2	2		2						7
Mortality Rate	12.5	4.3	6.9		33.3						5.9

Degree of Severity of Paralysis.—Analysis of the degree of severity of the paralysis as evidenced by the number of parts involved shows that in the cases treated with convalescent serum one and two parts were most frequently involved (35.9 per cent for one part; 28.2 per cent for two parts; remaining 35.9 per cent, three to eight parts). In the cases of patients receiving horse serum one part was involved in 32 per cent; two parts in 36 per cent and from three to six parts involved in the remaining 32 per cent. In the series not treated with serum one part was involved in 28.9 per cent; two parts in 35.1 per cent; and in the remaining 36 per cent, three to eight parts. It is evident, therefore, that there is little difference in the degree of severity of paralysis in the cases treated with convalescent serum, horse serum, or not treated with serum.

Serum Reaction.—In the cases treated with convalescent serum, there was a reaction (local or general) attributable to serum in approximately 11.8 per cent of the cases. In the cases treated by intramuscular injections there were 4.1 per cent reactions, and 18 per cent in those treated by intravenous injections. When horse serum was administered, however, reactions were much more commonly noted (79.4 per cent of the cases). When horse serum was employed intramuscularly, 85.7 per cent showed reactions, when intravenously, 68.1 per cent. There is little doubt, therefore, that the administration of horse serum was at-

tended much more frequently with reactions than was the convalescent serum. In general, there is no indication that patients having a reaction were subsequently paralyzed in any appreciably greater number than patients in whom no reaction occurred.

Route of Administration (Table VI).—Of the patients receiving convalescent serum, 42.3 per cent were treated by intravenous injections, and 20.3 per cent by the intramuscular injections. Other patients received convalescent serum intraspinally alone, and by various other

TABLE VI

ROUTE OF ADMINISTRATION

	CONVALESCENT SERUM				HORSE SERUM			
	NO. CASES	PERCENTAGE	DEATHS	PERCENTAGE	NO. CASES	PERCENTAGE	DEATHS	PERCENTAGE
Intravenous	50	42.3	4	57.1	22	30.1	1	16.6
Intramuscular	24	20.3	1	14.2	35	47.9	3	50.0
Intraspinal	3	2.5	0		1	1.3	0	
Intraspinal and Intravenous	10	8.4	0		1	1.3	0	
Intraspinal and Intramuscular	16	13.5	1	14.2	1	1.3	1	16.6
Intravenous and Intramuscular	12	10.1	1	14.2	13	17.8	1	16.6
Intraspinal, Intravenous and Intramuscular	3	2.5	0		0		0	
Totals	118		7		73		6	

combinations, e.g., intraspinally and intramuscularly, intraspinally and intravenously, intravenously and intramuscularly, intravenously and intramuscularly and intraspinally; but the number of cases is too small to justify inclusion in this analysis.

Of the patients receiving horse serum, 30.1 per cent were treated by intravenous injections alone, and 47.9 per cent intramuscularly.

Day of Disease Serum Was Administered, According to Route.—The majority of cases treated intravenously with convalescent serum received serum on the second day and intramuscularly also on the second day; and in the horse serum series, most cases were also treated intravenously on the second day and intramuscularly on the third day.

Paralysis, According to Route of Administration.—A consideration of the appearance of subsequent paralysis according to route of administration reveals that 26 per cent of fifty cases receiving convalescent serum intravenously became paralyzed; 4 per cent had a transient paralysis which cleared up before discharge from the hospital; 63 per cent never developed paralysis; and 8 per cent died. Of the 24 patients receiving convalescent serum intramuscularly, 20.8 per cent became paralyzed: 75 per cent never developed paralysis; and 4.2 per cent died. (The ap-

pearance of subsequent paralysis following other modes of administration is present in too small a number of cases to justify any analysis.)

Of twenty-two patients receiving horse serum intravenously 27.2 per cent were discharged paralyzed; 4.5 per cent had a transient paralysis with recovery before discharge; 63.6 per cent were never paralyzed; and 4.5 per cent died.

Of thirty-five patients receiving horse serum intramuscularly, 28.5 per cent were discharged paralyzed; 2.8 per cent were paralyzed but recovered from paralysis; 60 per cent were never paralyzed; and 8.5 per cent died.

It is evident from the above that there is a remarkably close correspondence in the results, so far as the route of administration is concerned, between the convalescent serum treated cases and the horse serum treated cases although the mortality by both routes was somewhat higher in the latter group.

Mortality Rate for Sex in Treated and Nontreated Groups.—It is interesting to note that in the cases treated with convalescent or horse serum, the death rate was approximately twice as great among the females as among the males. On the other hand, in the preparalytic cases receiving no serum, the death rate in the males was over six times as great as in the females. The number of cases in the latter group is, however, too small to allow any generalizations. The total death rate for all males was 13.18 per cent, and for females 11.25 per cent. In short, whereas the general mortality rate for males is slightly higher than for females, in the cases treated with serum, the female death rate is more than twice that of the male. These results suggest that the female, possibly due to some sex-linked characteristic, is a poor subject for serum therapy.

SUMMARY

Of 597 preparalytic cases, 118 received convalescent serum; 73 cases were treated with horse serum; and 396 received no treatment. No striking difference in the results of these three groups was noted so far as the development of subsequent paralysis is concerned. However, the mortality was about twice as high in patients treated with convalescent serum and nearly three times as high in patients receiving horse serum as in the patients receiving no serum therapy.

The comparability of the treated and untreated groups is discussed. Evidence is adduced to show that the treated cases were more severe than the untreated.

A consideration of the day of illness on which serum was administered shows that serum therapy was administered in the majority of cases early in the disease.

No conclusions can be drawn from a consideration of the day of illness on which paralysis developed.

The severity of subsequent paralysis in the treated and untreated cases is approximately the same.

The administration of horse serum was attended with a much greater degree of frequency of reaction than was the administration of convalescent serum.

CONCLUSIONS

In view of the inequality in number of cases in the treated and untreated groups and serious question of the comparability of the two groups so far as severity is concerned, the apparent failure of convalescent or horse serum to control the development of paralysis and the higher death rate in cases so treated must be considered suggestive and not conclusive. On the other hand, there is absolutely no shred of positive evidence that the use of either convalescent serum or immune horse serum is of any value in preventing paralysis or lessening mortality.

THE DIFFERENTIAL DIAGNOSIS OF ACUTE POLIOMYELITIS

III. Clinical Studies of Poliomyelitis

John Fitch Landon, M.D.
New York, N. Y.

DURING the epidemic of 1931, eighty-six cases (Table I) were admitted to the Willard Parker Hospital as poliomyelitis and discharged from that institution with a different diagnosis. The protean nature of the disease, coupled with the inevitable apprehension and popular hysteria naturally present at the onset of any epidemic of poliomyelitis, makes errors in diagnosis on the part of the practicing physician or of the health department diagnostician quite comprehensible.

It is our purpose to discuss a number of conditions which must be differentially diagnosed from acute poliomyelitis, and to analyze further the criteria employed in such diagnosis with especial reference to the cell count. A communication on the first phase of this subject has recently appeared from the Herman Kiefer Hospital in Detroit, where Gordon[1] listed fifty-three conditions confused with poliomyelitis among 446 cases admitted to that institution as poliomyelitis. In 1932 also Sherwood[2] reported forty-three cases of different diseases which were suspected of being poliomyelitis. A similar series of cases was observed in 1929 by Aycock, Kramer, and others.[3]

The early symptoms of poliomyelitis in the 1931 New York epidemic were confined largely to the gastrointestinal tract or to the upper respiratory system. It is therefore quite natural that a considerable number of cases exhibiting these symptoms should have been sent to the hospital with the diagnosis of poliomyelitis, especially when proved cases of this disease had been observed in the same family or in the immediate vicinity. Sixteen cases subsequently diagnosed as acute enterocolitis or gastrointestinal upsets were admitted to the Willard Parker Hospital as cases of anterior poliomyelitis. Twenty-four cases diagnosed subsequently as upper respiratory infections, colds, pharyngitis, tonsillitis, or otitis media, were also admitted. The diagnosis in the above cases was presumably made on the cell count and a history of contact with a definite case of poliomyelitis. It may be well at this time to point out that several competent observers have criticized the acceptance of a spinal fluid count over ten or twelve cells, in suspected poliomyelitis, as conclusive corroborative evidence of the existence of that infection in epidemic times. They point out that a moderate pleocytosis may occur in a number of other diseases in which the onset is

characterized by the signs of meningeal irritation, such as headache, delirium, irritability, hyperesthesia, and exaggerated reflex activity. Herrick[4] states, "There is no question that the meningeal-choroidal complex shares in the systemic reaction of the toxins or the infective agents of a very considerable number of acute diseases, and that the cerebral spinal fluid of meningismus is not always or even usually normal." He backs up this statement by a careful review of the literature and an analysis of seventy-six cases personally observed. In twelve cases of lobar pneumonia he found a cellular reaction of 12 to 200 cells; in fourteen cases of bronchopneumonia the cells were increased from 12 to 30 in five cases; five out of fourteen cases of influenza observed showed cells ranging from 14 to 40. One case of acute tonsillitis was found to have 172 cells. Similar increases occurred in scarlet fever, measles, variola herpes zoster, parotitis, typhoid fever, and sepsis. In approximately one-third of the cases studied by him the cerebrospinal fluid showed some variation from normal. He concludes that "the greatest caution should be used in making the diagnosis of meningitis or poliomyelitis from fever, meningismus, and the changes in the cerebrospinal fluids mentioned. The cases with less than 100 cells should be viewed with skepticism, unless clinical, epidemiologic, or other laboratory evidence is decisive."

In the present study of twenty cases of upper respiratory infections only two showed a cell count of over ten cells. Two cases of otitis media were observed, in both of which there was a moderate pleocytosis. Of six cases of pneumonia only one showed any increase over normal (40 cells). Out of thirteen cases of enterocolitis there was but one that showed any deviation from the normal (80 cells).

These findings, while not entirely corroborating Herrick's work, are suggestive enough to make one skeptical about accepting a diagnosis of poliomyelitis (even in the presence of an epidemic) if based on a pleocytosis without ample corroborating clinical evidence.

In analyzing over 2,700 cases admitted as poliomyelitis to the hospitals of the New York Department of Hospitals in 1931, any case in which the cell count was below 50, if totally uncorroborated by the clinical findings, was rejected, and a minimum of 25 cells was established for the acceptance of partially corroborated cases. As a result, approximately 300 cases were rejected.

A number of other conditions were mistaken for poliomyelitis. The differential diagnosis of these various conditions will now be discussed. These cases naturally fall into two groups: (1) those exhibiting evidence of involvement of the central nervous system without demonstrable paralysis and (2) those showing paralysis or pseudoparalysis.

TABLE I

DIFFERENTIAL DIAGNOSIS

ADMISSION DIAGNOSIS	DAY OF ILLNESS TAP DONE	NO. OF CELLS	FINAL DIAGNOSIS
Early Polio	1st	None	Acute enterocolitis
Polio	2nd	None	Acute enterocolitis
Polio	2nd	5	Enterocolitis
Polio	2nd	80	Enterocolitis
Polio?	1st	8	Enterocolitis
Obs. Polio	2nd	Bloody tap	Enterocolitis
Polio	5th	None	Gastroenteritis
Polio	4th	3	Gastroenteritis
Obs. Polio	2nd	4	Gastroenteritis
Obs. Polio	7th	7	Gastroenteritis
Obs. Polio	2nd	None	Gastroenteritis
Obs. Polio	2nd	None	Gastroenteritis
Polio	5th	None	Gastroenteritis
Polio	1st	5	Gastrointestinal upset
Polio	2nd	None	Gastrointestinal upset
Obs. Polio	1st	None	Gastrointestinal upset
Polio	8th	2	Upper respiratory infection
Polio	2nd	6	Upper respiratory infection
Polio	2nd	8-10	Upper respiratory infection
Polio	2nd	5	Upper respiratory infection
Bulbar Polio	2nd	5	Upper respiratory infection
Polio	1st	9	Upper respiratory infection
Polio	2nd	4	Upper respiratory infection
Polio	2nd	4	Upper respiratory infection
Polio	3rd	2	Upper respiratory infection
Polio	2nd	2	Upper respiratory infection
Polio?	2nd	None	Upper respiratory infection
Polio	3rd	5	Upper respiratory infection
Polio	3rd	None	Upper respiratory infection
Polio?	1st	5	Cold
Polio	4th	2	Cold
Obs. Polio	3rd	12	Pharyngitis
Obs. Polio	3rd	70	Pharyngitis
Polio	3rd	5	Pharyngitis
Polio	Not tapped	–	Pharyngitis and otitis media
Polio?	1st	2	Acute tonsillitis and pharyngitis
Polio	3rd	2	Acute tonsillitis with rheumatism, etc.
Polio	3rd	2	Tonsillitis
Polio	7th	Bloody tap	Otitis media
	9th	20	
Obs. Polio	2nd	12	Otitis media
Polio	1st	None	Cervical adenitis
Polio	4th	1	Lobar pneumonia
Prepolio	2nd	10	Lobar pneumonia
Polio	2nd	None	Lobar pneumonia
Polio	4th	None	Lobar pneumonia
Polio	2nd (Before Admission)	10	Lobar pneumonia
	2nd (After Admission)	40	
Polio	Not tapped	–	Bronchopneumonia
Polio	5th	None	Septicemia
Polio	2nd	None	Acute rheumatic fever
Polio?	4th	4	Rheumatic fever
Polio?	5th	5	Rheumatic torticollis
Obs. Polio	5th	2400	Cerebrospinal meningitis
Obs. Polio	11th	420	Tuberculous meningitis

TABLE I—CONT'D

ADMISSION DIAGNOSIS	DAY OF ILLNESS TAP DONE	NO. OF CELLS	FINAL DIAGNOSIS
Polio	15th	150	Tuberculous meningitis
Polio	8th	60	Tuberculous meningitis
Polio or T. B. Meningitis	12th	210	Tuberculous meningitis
Polio?	7th	800	Streptococcus meningitis
Polio	4th	9	Neuritis, right hip
Obs. Polio	3rd	3	Neuritis, left hip
Polio	10th	1	Polyneuritis
Polio	1st	2	Peripheral neuritis
	2nd	10	
Polio	8th	2	Bell's palsy
Polio	5th	4	Epidural abscess
Polio	8th	5	Subacute infection of right hip —possibly tbc.
Polio	2nd	Bloody tap	Osteomyelitis
Polio	11th	7	Spasticity hamstring tendons, infection left knee
Obs. Polio	3rd	5	Acute arthritis
Polio?	1st	5	Deep abscess, right thigh
Polio	3rd	2	Infection of right elbow
Polio	Not tapped	–	Acute osteomyelitis
Obs. Polio	8th	1	Epiphysitis
Obs. Polio	2nd	8	Focal myelitis
Polio	2nd	5	Tenosynovitis
Polio	7th	2	Traumatic myositis
Polio?	6th	5	Shoulder injury
Polio	1st	8	Torticollis
Obs. Polio	1st	6	Torticollis
Polio	10th	300	Neurosyphilis
Obs. Polio	?	Bloody tap	Cerebral arteriosclerosis
Polio	5th	8	Hysteria
Polio Encephalitis	3rd	4	Hysteria
Polio	2nd	2	Hysteria
Obs. Polio	4th	4	Hysteria
Obs. Polio	3rd	10	Acute appendicitis
Polio Encephalitis	2nd	120	Acute transverse myelitis
Obs. Polio	3rd	3	Tetanus

NOTE: "Obs," signifies "observation" poliomyelitis, i. e., cases admitted to the isolation service with a tentative diagnosis of poliomyelitis.
"Prepolio"—preparalytic poliomyelitis.

CONDITIONS EXHIBITING EVIDENCE OF INVOLVEMENT OF THE CENTRAL NERVOUS SYSTEM WITHOUT DEMONSTRABLE PARALYSIS

Tuberculous Meningitis

Certain types of poliomyelitis may simulate tuberculous meningitis so closely as to make an early diagnosis practically impossible during inter-epidemic times. In both conditions there may be drowsiness although as a rule in poliomyelitis the stupor is much less profound. Marked hyperesthesia is usually present in both diseases. The onset of both may be variable but is commonly more sudden in poliomyelitis; in the latter there is also frequently a history of a gastrointestinal or upper respiratory disturbance. In tuberculous menin-

gitis the pulse is apt to be more irregular and usually slower, and the temperature commonly is not as high but more constantly protracted. Vomiting occurs in both conditions, but as a rule it is during the early stage in poliomyelitis when it is not projectile in character. Signs of meningeal irritation—stiff and painful neck and retraction of the head, etc.—occur earlier and more constantly in poliomyelitis. Early loss of reflexes or any unilateral alteration of reflexes points more to poliomyelitis although the deep reflexes, especially in children, are notoriously unreliable.

The spinal fluid may show essentially the same findings in the two conditions. In both the fluid is usually clear and without color although it may be "ground glass" in appearance and the pressure may be slightly increased or normal. In either disease a web or film formation may occur—more characteristically in tuberculous meningitis. In both there is an increase in the albumin content and a moderate increase in cells, with the mononuclears predominating. A high cell count (over 1,000) is more suggestive of poliomyelitis. The sugar content is commonly high in the encephalitic type of poliomyelitis while subnormal or low normal figures are found in tuberculous meningitis, particularly as the disease progresses. In the latter condition, too, the blood sugar is usually high, thus giving a characteristically low percentile relation between the spinal fluid and blood sugar. Also in tuberculous meningitis Lyttle[5] lays great stress on the low spinal fluid chlorides, which he considers pathognomonic of that condition. The final differential diagnosis must depend, however, either on the finding of the tubercle bacillus in tuberculous meningitis, or the appearance of the characteristic palsies in poliomyelitis.

Case 4986.—E. B., female, aged two years, was admitted to Willard Parker Hospital August 23, 1931, on eleventh day of illness. Onset August 13, with fever, which has continued, accompanied by nausea, vomiting, and convulsions. On admission, temperature 105° F., pulse 160, respiration 50. Examination revealed a well-developed and nourished child in a convulsive state; convulsions generalized and clonic; very little cyanosis; pupils dilated; no paralysis of pharynx; respirations very irregular. Admission diagnosis: observation poliomyelitis. August 23, 35 c.c. "ground glass" fluid removed under increased pressure; 420 cells, lymphocytes predominating. August 24, child markedly stuporous; bilateral Babinski's; negative Kernig's signs; pupils remaining markedly dilated; pulse down to 96; temperature high. August 25, Mantoux test positive; tubercle bacilli found in spinal fluid. August 29, patient died. Final diagnosis: tuberculous meningitis.

Case 4780.—J. S., male, aged two years, admitted to Willard Parker Hospital on August 14, 1931, on ninth day of illness. History of fever, vomiting, and headache for previous eight days. On admission: temperature 100° F., pulse 134, respiration 32; acutely ill; stiff neck; Brudzinski's and Kernig's reflexes present; all deep reflexes slightly hyperactive; pharynx injected; no paralysis; spinal tap showed bloody fluid under slightly increased pressure. Diagnosis: preparalytic poliomyelitis. From August 14 to August 19 there was continued temperature, drowsiness, and irritability. August 19, right internal strabismus developed; spinal fluid 100 lympho-

cytes; sugar present. August 20, Mantoux test positive. August 21, continued drowsiness; left pupil larger than right; facial asymmetry; breathing irregular at times. X-ray showed miliary tuberculosis. Spinal tap showed 150 white cells, 80 per cent lymphocytes; numerous tubercle bacilli found in spinal fluid. August 26, patient died. Final diagnosis: tuberculous meningitis.

Meningococcus Meningitis

Epidemics of meningococcus meningitis appear usually in the winter and spring; poliomyelitis is commonly a warm weather disease. However, sporadic cases of either condition may occur at any time and thus offer considerable difficulty in early diagnosis. On the whole, in meningitis the neck is much stiffer, and Kernig's and Brudzinski's signs more marked. There is much less hyperesthesia than in poliomyelitis and the psychic disturbances, especially delirium, are more pronounced. The most characteristic clinical differential point is the common presence of herpes labialis in meningococcus meningitis, a sign rarely found in poliomyelitis. The spinal fluid of meningococcus meningitis is characteristically turbid, containing a large number of polymorphonuclear cells, usually several thousand. The intracellular gram-negative diplococcus is usually present although at times the smear may be negative and several cultures necessary to demonstrate the organism.

CASE 4713.—A. C., six-month-old male, was admitted to Willard Parker Hospital August 10, on the fifth day of illness. August 5, onset with gastrointestinal upset, fever and vomiting. Local doctor said patient had gastrointestinal upset. August 7, temperature 105° F. Another doctor was called in and also diagnosed gastrointestinal upset. First doctor called again, and found child's temperature still high; said child had pneumonia or poliomyelitis. Third doctor called in and found child had stiff neck. Board of Health diagnostician called; child sent to hospital as observation poliomyelitis. On admission: temperature 104° F., pulse 166, respiration 44. Neurologic examination revealed slightly stiff neck and hyperactive reflexes; no Kernig's reflexes. Spinal tap, 2,400 cells; 80 per cent polymorphonuclears; no sugar. August 12, meningococci found and antimeningococcic serum given. Discharged cured on twenty-third day of illness. Final diagnosis: cerebrospinal meningitis.

Pneumococcus and Streptococcus Meningitis

In pneumococcus or streptococcus meningitis there is usually a preceding otitis media or pneumonia, or a history of skull trauma. Meningeal signs are more marked than in poliomyelitis, and the spinal fluid is characteristically turbid or purulent: yellow in streptococcus meningitis and with a greenish tinge in pneumococcus meningitis. In the latter condition the characteristic gram-positive lance-shaped extracellular diplococcus is usually easy to find while in streptococcus meningitis many gram-positive cocci in chains may be demonstrated.

CASE 4274.—R. M., male, aged two years, was admitted to Willard Parker Hospital July 28, on seventh day of illness. July 22, onset with vomiting, fever, constipation, and abdominal pain. Persistent high temperature since onset; stiff neck and back.

On admission: temperature 102° F., pulse 110, respiration 32; acutely ill white infant; slight stiff neck; "poker" spine. Admission diagnosis: preparalytic poliomyelitis or meningitis. August 1, temperature still high; child acutely ill. Brudzinski's sign positive; neck still rigid. August 3, no clinical evidence present of poliomyelitis or meningitis. August 4, blood transfusion, 200 c.c. given. August 6, temperature spiking. August 9, diminished breath sounds and fine râles at right base; increased rigidity of neck. August 11, child failing; spinal fluid, 800 cells; culture showed hemolytic streptococcus. August 17, patient died. Final diagnosis: streptococcus meningitis.

Other Forms of Meningitis

Influenzal, colon bacillus, and staphylococcus meningitis must be diagnosed by the identification of the specific organism bacteriologically. In syphilitic meningitis there is a variable increase in cells, albumin and globulin in the spinal fluid with a positive Wassermann reaction and typical syphilitic colloidal gold curves.

CASE 5875.—L. M., male, aged forty-three years, was admitted to Willard Parker Hospital October 28, on eleventh day of illness as observation poliomyelitis. Ten days before, patient on arising in morning noticed headache, sore throat, weakness in legs; vomited twice that day; remained in bed three days. On arising, he was unable to walk. On admission: weakness in both lower extremities; sensation intact; knee jerks absent; no Babinski's reflexes; irregular pupils; right pupil reacts to light and accommodation; left only to accommodation. October 26, spinal tap showed 228 cells, albumin 2 plus, globulin 2 plus, sugar negative; temperature 98; pulse 92; respirations 20. Spinal fluid—"ground glass" 300 cells; 98 per cent mononuclears, albumin 1 plus, globulin 1 plus, sugar 3 plus. October 30, spinal fluid 130 cells, 100 per cent mononuclears. Colloidal gold curve 1245555553; Wassermann 4 plus. Final diagnosis: neurosyphilis.

Meningismus

Meningismus which not infrequently accompanies the onset of many acute infections including scarlet fever, measles, variola, pertussis, gastroenteritis, and notably pneumonia (both lobar and bronchial), must be differentiated from the early stage of poliomyelitis. This is sometimes most difficult especially since an increase in the cells of the spinal fluid occurs in both conditions. A determination of the primary cause of the meningism must be made.

CASE 5157.—J. L., male, aged eight years, was admitted to Willard Parker Hospital August 30, on second day of illness as observation poliomyelitis. History of vomiting, cough, and pain in back of head, and weakness of left leg. On admission, he was acutely ill with rigid neck, positive Brudzinski's and Kernig's signs; no muscle weakness; temperature 103.6° F., pulse 128, respiration 28. Spinal fluid, 40 cells. September 1, signs of pneumonia, right upper lobe; no paralysis. Final diagnosis: pneumonia, right upper lobe.

CASE 5472.—H. X., male, aged seven years, was admitted to Willard Parker Hospital September 21, on first day of illness as poliomyelitis case. Patient awoke during night with fever, chills, headache, and vomiting. In the morning neck was stiff,

and there was pain in left side of abdomen. On admission: temperature 103.4° F., pulse 140, respiration 32; no neurologic pathology; no paralysis; neck somewhat rigid and painful; spinal fluid, no cells. September 22, marked cervical rigidity, positive Kernig's and Brudzinski's signs; abdomen tense but no rigidity. September 23, temperature over 104° F.; signs of meningeal irritation; bloody diarrhea, local tenderness in right quadrant. September 25, temperature lower, diarrhea continued, blood and mucus in stools persist. October 3, patient discharged cured. Final diagnosis: acute enterocolitis.

CASE 5582.—K. G., four-year-old male, was admitted to Willard Parker Hospital September 30, on second day of illness, as observation poliomyelitis. Onset September 29 with vomiting and fever; blood vomited twice; and stools loose. Slight rigidity of neck and back and pain in abdomen. Child complained of pain in neck. On admission: temperature 104.4° F., pulse 136, respiration 32; coarse tremors and convulsive movements; slight rigidity of neck and back. No Brudzinski's, Babinski's, or Kernig's signs; deep reflexes all hyperactive. Stools negative for typhoid or dysentery. Spinal fluid bloody (from trauma). Final diagnosis: enterocolitis.

Acute Rheumatic Fever

Acute rheumatic fever must be differentiated by the more protracted febrile course, the absence of palsies or any alteration of reflexes, by the presence of a normal spinal fluid and finally by the favorable response to salicylates. Rheumatic nodules may sometimes be demonstrated.

CASE 5108.—S. K., male, aged three and one-half years, was admitted to Willard Parker Hospital on August 28, on second day of illness as poliomyelitis case. August 27, onset with fever, irritability, and pain in left leg. August 28, right leg painful. On admission: temperature 102° F., pulse 140, respiration 32; child acutely ill; very irritable; throat very red; tonsils large and inflamed; neck stiff. Positive Brudzinski's, suggestive Kernig's signs; back rigid; all deep reflexes hyperactive; no paralyses; spinal fluid showed no cells. August 29, heart showed systolic murmur transmitted to axilla. On palms of both hands there were small erythematous nodes. Knee joints were painful without swelling or redness. Final diagnosis: acute rheumatic fever.

Rheumatic Torticollis

Rheumatic torticollis may occasionally be confused with poliomyelitis, because of the painful neck.

CASE 5419.—E. M., female, aged fourteen years, was admitted to Willard Parker Hospital September 17, on fifth day of illness as observation poliomyelitis. Onset September 13, with pain in right side of neck, stiffness of neck, and fever. September 14, slightly improved; neck stiff. September 15, no vomiting; no headache. September 16, physician called who made diagnosis of poliomyelitis. On admission: temperature 102.4° F., pulse 120, respiration 24; stiffness of right sternocleidomastoid muscle with some tenderness on manipulation. Girl had difficulty sitting up; said neck hurt when she tried to sit up. Neurologic examination negative; no paralyses. Spinal fluid, 5 cells. September 19, still some pain in right sternomastoid muscle. September 21, still had some slight fever; neck much improved. Patient discharged September 23, cured. Final diagnosis: rheumatic torticollis.

Sepsis

Sepsis may also at times simulate poliomyelitis at the onset.

CASE 6082.—C. D., thirteen-year-old female, was admitted to Willard Parker Hospital, November 13, 1931, as observation poliomyelitis case; had had cold for prior three weeks; pain and aches in neck, arms and legs preceding two days; fever and stiffness of neck since November 11; pain in calves of legs for one day. Physical examination: temperature 101.8° F., pulse 142, respiration 32; acutely ill; reflexes all present and active; no paralyses. Neck showed some pain and tenderness in motion, not of the type seen in poliomyelitis, but rather a definite muscle affair. Shoulders, elbows, knees, ankles, and thighs showed some pain on motion. There was no swelling or redness of the joints. Spinal fluid, no cells. Blood count: 15,180 white blood cells; polymorphonuclears, 80 per cent. Admission diagnosis: acute rheumatic fever. November 14, blood culture shows streptococcus viridans. Final diagnosis: septicemia.

Acute Appendicitis

The vomiting and abdominal pain of an early acute appendicitis may simulate the onset of poliomyelitis.

CASE 5704.—R. J., male, aged six years, was admitted to Willard Parker Hospital October 9, on third day of illness as observation poliomyelitis. October 7, sore throat and nasal discharge. October 8, vomiting and inability to retain food. On admission: temperature 99.2° F., pulse 88, respiration 26. Abdomen somewhat tender in right lower quadrant but not rigid or distended. Neurologic—negative. No paralysis; spinal fluid, 10 cells. October 10, marked neck rigidity and severe abdominal pain for preceding twelve hours. White blood count, 19,200; 87 per cent polymorphonuclears. Final diagnosis: acute appendicitis with local peritonitis.

On the other hand, cases of poliomyelitis have occasionally been operated on erroneously. During the 1931 epidemic there occurred a case of fulminating bulbar poliomyelitis from which a normal appendix was removed twenty-four hours prior to death.

Tetanus

Tetanus may in rare instances be confused early with poliomyelitis. The development of the typical trismus and "risus sardonicus" combined with negative spinal fluid findings will clear up the diagnosis.

CASE 5414.—K. S., male, aged eight years, was admitted to Willard Parker Hospital September 16, on third day of illness as observation poliomyelitis. History of September 14: defective speech and choking and convulsions on September 16, with cyanosis, rigidity of entire body and droop of right eyelid and sweating. On admission: temperature 100.8° F., pulse 122, respiration 24. Patient showed marked trismus although tongue at times could be slightly protruded. Facies appeared "risus sardonicus" type; marked nuchal rigidity with opisthotonos; sternocleidomastoid spasm marked at times. Lower extremities spastic; reflexes hyperactive; no paralysis; no abnormal reflexes. Lumbar puncture showed 3 cells under no increased pressure. Final diagnosis: tetanus. Discharged cured. (280,000 units of tetanus antitoxin were given over a period of six days.)

CONDITIONS SHOWING PARALYSIS OR PSEUDOPARALYSIS

Peripheral Neuritis

Peripheral neuritis may usually be differentiated from poliomyelitis by the history of chronic alcoholism, lead, arsenic, mercury poisoning, or more commonly in children, by a history of a recent attack of diphtheria, by the more gradual development of the paralysis, the lack of an immediately preceding febrile stage, by the symmetrical nature of the paralysis, not only as to site, but as to muscle groups affected, and by the benign course as compared with the persistent paralysis of poliomyelitis. Spinal fluid changes are absent in polyneuritis. Concerning the sensory changes of multiple neuritis Wickman[6] makes the illuminating statement, "The existence of sensory disturbances has been looked upon as a distinguishing feature between acute polyneuritis and the spinal form of acute poliomyelitis. But sensory changes are not constant in the former, and they have been observed in the latter disease. When sensory loss, however, does occur in Heine-Medin's disease, it is not marked; it is seldom persistent, and it affects only the sensation of pain, heat and cold. These sensory changes arise from implication of the posterior horn. They can be satisfactorily demonstrated only in adults. In children, as dissociated sensory loss is difficult to determine, the disturbance is usually charted as a complete anesthesia. But if decreased perception of all forms of sensation really exist, or if the sense of touch be diminished and tenderness on pressure be present, the case is one of neuritis."

The electrical reactions offer no aid as they may be the same in the two conditions.

CASE 4727.—P. H., female, aged thirty-two years, was admitted as observation poliomyelitis to Willard Parker Hospital August 11, on tenth day of illness. Onset was sudden; after bathing felt a tingling sensation in fingers and toes; following day she had shooting pains over body and extremities and numbness of hands and feet; difficulty in walking straight. Physical examination on admission: temperature 100.6° F., pulse 110, respiration 24; not acutely ill; all deep reflexes absent; gait ataxic; positive Romberg's sign; ataxic fingers to nose; no motor weakness; no diminution to pain. Nerves and muscles tender. Spinal fluid, 1 cell. Final diagnosis: polyneuritis of unascertained etiology.

Injury or Infection of Bone, Joints, or Muscles

Under this heading are grouped traumatic conditions such as fracture, sprain, epiphysitis, etc., any infectious process in the bone or joint, as, for example, an osteomyelitis, or a tuberculous or pyogenic joint. The differential diagnosis may usually be made by a careful examination of the part affected, assisted by the x-ray, and by the absence of the usual invasive symptoms of meningeal irritation commonly characteristic of poliomyelitis, and the presence of a normal spinal fluid.

CASE 4299.—W. T., eleven-year-old male, was admitted as poliomyelitis case to Willard Parker Hospital July 29, on seventh day of illness. On July 23, patient fell and complained thereafter of pain in left arm. Arm weak then and remained the same. July 28, he fell again on left arm and July 29 was unable to lift arm. No history of fever, vomiting, or pain in back; temperature 101° F. on admission, pulse 118, respiration 28; he was unable to lift arm to horizontal position; could abduct and adduct entire arm and flex at elbow. No neurologic abnormalities. Spinal fluid, 2 mononuclears; albumin 1 plus; globulin 1 plus, and sugar 3 plus. X-ray of left shoulder negative. Final diagnosis: traumatic myositis.

CASE 5467.—L. F., female, aged nineteen months, was admitted as questionable case of poliomyelitis to Willard Parker Hospital September 21, on sixth day of illness. September 14 patient fell; September 16, fever. September 17, she refused to stand or walk. September 19, vomited once; constipated since onset. On admission: temperature 101.8° F., pulse 140, respiration 28; irritable; not acutely ill; bladder distended; right thigh spastic (voluntary). Child could move leg but cried when touched. There was edema and tenderness but no redness or heat. Spinal fluid, 5 cells. No neurologic signs. September 26, surgical consultation. "Swelling of right upper thigh has been getting larger since admission and temperature has started to go up. Examination shows a hard mass with considerable swelling of right upper thigh anteriorly. Fluctuation?" Final diagnosis: deep abscess of right thigh.

CASE 5815.—E. L., male, aged one year, was admitted to Willard Parker Hospital as case of poliomyelitis October 22, on thirteenth day of illness. Onset October 10 with cold and vomiting. October 17, apparent paralysis of right leg; child vomited once and had pain in right leg. On admission: temperature 102.6° F., pulse 96, respiration 34; did not appear acutely ill. Neurologic examination negative. On lateral aspect of right fibula there was a swollen painful area which was quite tense and appeared warmer than left. Area of greatest swelling was in region of head and epiphysis of fibula. Spinal tap not done. Final diagnosis: osteomyelitis, right fibula, with abscess.

CASE 4381.—P. S., male, aged fourteen years, was admitted to Willard Parker Hospital as case of observation poliomyelitis August 8, on third day of illness. July 30, onset with headache, fever of 105° F., sore throat, backache, and vomiting. July 31, pain in right ankle joint and rash on body. On admission: temperature 101.6° F., pulse 114, respiration 34; acutely ill; complained of pain in right ankle; limitation of motion in right foot; particularly over joint; marked tenderness over ankle joint; slight increase in heat; dilated veins but no redness. Skin showed generalized petechial rash more on arms and legs; herpes labialis. Neurologic examination, negative. Spinal fluid, 5 mononuclears; albumin, 1 plus; globulin, 1 plus; sugar, 3 plus. Final diagnosis: acute arthritis with purpura.

Hysteria

In adults and older children during epidemic times cases of hysteria are not so uncommon, especially when the patient has been in contact with, or has taken care of, a case of poliomyelitis. In hysteria sensory changes are usually marked, the reflexes are present, and there is no atrophy. Fever is lacking, and the patient's psychic state may be recognized as abnormal. The pharyngeal and corneal reflexes may be absent.

CASE 4944.—A. S., female, aged twenty-six years, was admitted to Willard Parker Hospital August 21, on fifth day of illness as observation poliomyelitis. History: nursed a patient with poliomyelitis three weeks before. August 17, developed pains in legs and neck, never any fever, no vomiting. On admission: temperature 99.4° F., pulse 108, respiration 30; not acutely ill; very sluggish corneal reflexes; deep reflexes all active; questionable weakness of all muscles; unable to sit up unassisted; touch and pinpoint sensation diminished on right side of body. Lack of muscular power entirely out of proportion to clinical picture; voluntary rigidity. August 20, spinal tap, 8 cells. Final diagnosis: hysteria.

Facial Paralysis

Facial paralysis may of course occur in a number of conditions, notably middle ear infections, and must be differentiated from the isolated facial palsy of poliomyelitis by the history, course, and spinal fluid findings.

CASE 4859.—R. S., female, aged thirty-three years, was admitted to Willard Parker Hospital August 17, on eighth day of illness. On August 10, pain in ear with headache; no fever, vomiting, or sore throat. Five days later paralysis of entire left side of face. On admission: temperature 99° F., pulse 90, respiration 20; physical examination essentially negative except for facial paralysis. No rigidity of neck; loss of taste; anesthesia two-thirds left side of tongue. Lumbar puncture—2 lymphocytes. Final diagnosis: left Bell's palsy.

Transverse Myelitis

Transverse myelitis, either of traumatic or infectious origin, must occasionally be differentiated from poliomyelitis. In the former condition, in addition to the usual complete flaccid paralysis of the lower limbs, there is commonly loss of all sensation.

CASE 6650.—P. S., male, aged thirty-nine years, was admitted to Willard Parker Hospital as case of poliomyelitis December 30, 1931, on second day of illness. Illness began December 29 with general malaise and pain in back of head and back; on awakening, he was unable to use legs; urine retained; recently had cut left middle finger which became infected. On admission: temperature 101° F., pulse 76, respiration 22; moderately ill; bladder distended to umbilicus; flaccid paralysis of both lower extremities, with absent cremasteries and abdominals, A. J's and K. J's. No Babinski, no Kernig. Neck not stiff. Loss of all sensation as high as third rib on both sides. Spinal fluid, 120 cells, all polymorphonuclears. Sugar 3 plus. Diagnosis: Acute transverse myelitis of infectious origin.

CASE 5625.—D. D., male, aged twenty years, was admitted to Willard Parker Hospital October 3, 1931, on fifth day of illness, as poliomyelitis case; was treated for lumbago. September 29, had cold and backache. October 2, paralysis of both legs. On admission: temperature 103.4° F., pulse 126, respiration 26; spinal fluid, 4 cells; distention of bladder; catheterized; acutely ill; neck stiff. Both legs paralyzed with reflexes all gone, including cremasterics. October 5, apparently there was some loss of sensation, especially pain, in extremities. Vibratory sense in both legs normal. Opinion: transverse myelitis of infectious origin. Autopsy revealed a pyemia resulting in multiple abscess of the lungs and a staphylococcic pneumonia of the bases and extensive extradural abscesses about the cord.

REFERENCES

1. Gordon, J. E.: J. A. M. A. **99:** 1043, 1932.
2. Sherwood, D. N.: New England J. Med. **207:** 571, 1932.
3. Aycock, W. L., Luther, E. H., McKhann, C. R., Smith, E. C., and Kramer, S. D.: J. Infect. Dis. **45:** 175, 1929.
4. Herrick, W. W., and Dannenberg, A. M.: J. A. M. A. **73:** 1321, 1919.
5. Lyttle, J. D.: Laboratory Pediatrics, New York, 1930, D. Appleton-Century and Co.
6. Wickman, I.: Handb. d. Neurol. (Lewandowsky) **2:** 807, 1911; Eng. Trans., J. Nerv. and Ment. Dis. Monograph Series No. 16, 1913.

EPHEDRINE SULPHATE IN THE TREATMENT OF THE BULBAR TYPE OF POLIOMYELITIS

IV. Clinical Studies of Poliomyelitis

John Fitch Landon, M.D.
New York, N. Y.

THE employment of vasoconstrictive drugs intraspinally dates from the New York epidemic of 1916. At this time Meltzer[1] advocated the use of epinephrine (adrenalin) intrathecally on the ground that the damage done the ganglion cells is due directly to pressure from edema, and indirectly to ischemia resulting from compression of the spinal cord and vessels. The well-known vasoconstrictive action of epinephrine should theoretically be expected to relieve this edema. Meltzer advised injections of various amounts of this drug depending upon the age of the patient, at least every four hours for several days after the paralysis has disappeared or has remained stationary. It was further noted by Hoyne and Cepelka[2] that immediately after injection of epinephrine intraspinally there was partial temporary return of function of a paralyzed limb. This is what might be expected of epinephrine, the vasoconstricting action of which is fleeting. Le Boutillier[3] found the use of adrenalin after lumbar puncture efficacious except when the lesion was high. In the 1916 epidemic in New York City, however, it was stated, "the results obtained (following the intraspinal administration of adrenalin) did not justify its use; it was not found to be superior to other forms of treatment."[4] Weisenburg[5] was also skeptical of its value and noted that severe reactions sometimes occurred.

Because of the well-known very transient effect of epinephrine, and also because of the subsequent vasodilatation which follows its vasoconstricting action, Brahdy and Scheffer[6] employed ephedrine sulphate, the action of which is similar to epinephrine but much more sustained and without a vasodilatory component. These observers treated ten cases of severe sporadic bulbar poliomyelitis in 1928 (an interepidemic year) with the intrathecal injection of from 40 to 60 mg. of ephedrine. The mortality in this group was 50 per cent as compared with 75 per cent in a control group of twelve cases. The number of cases in this series is obviously too small to justify the drawing of any definite conclusions.

During the 1931 epidemic it was possible, at the Willard Parker Hospital, to make a more exhaustive study of this mode of treatment.

A relatively large series of cases, almost exclusively of the bulbar type, were treated with ephedrine.

DETAILS OF TREATMENT EMPLOYED

No. of doses given	1	2	3	4	5	6	7	Total
No. of cases	34	18	5	5	–	2	2	66
Total doses	34	36	15	20	–	12	14	131

Average No. of doses per case 1.98

No. of mg. per dose	45	50	60	75	80	90	100	120	Total
No. of doses	3	7	11	9	1	34	44	22	131
Total mg.	135	350	660	675	80	3060	4400	2640	12,000

Average No. of mg. per dose 91.6

Average interval between treatments—16.98 hr.

Shortest 6¾ hr.
Longest 60 hr.

Mode of administration

53 patients were given ephedrine intraspinally
8 patients were given ephedrine cisternally
5 patients were given ephedrine by both routes

66 patients

It was possible to observe a fairly large group of bulbar cases (111 cases) in which only symptomatic treatment was employed. This study represents the first compilation of data dealing with ephedrine-treated cases in which any comparable control group has been observed. In the control series of cases only those cases which received purely symptomatic treatment were included. Patients receiving respirator care or human convalescent or immune horse serum were omitted from the study.

At the onset we realized that a just criticism of such a study might exist in the danger of comparing moribund or severe cases in one group with milder cases in the other group. Consequently, the degree of severity of the individual case was taken into consideration. In the group treated with ephedrine, the degree of severity of the case was estimated just prior to the ephedrine treatment; in the control series the degree of severity was estimated as of admission to the hospital. Inasmuch as 73 per cent of the ephedrine-treated cases received their first dose within the first twenty-four hours after admission and 13 per cent more within forty-eight hours (a total of 86 per cent within forty-eight hours), there is only a moderate difference in the time the degree of severity was estimated.

As may be seen in Table I, in the ephedrine-treated cases, excluding moribund and mild cases, there were thirty-two cases graded as severe with a mortality of 68.7 per cent, and twenty-three cases graded as moderate with a mortality of 26.1 per cent. These two groups combined give a mortality of 50.9 per cent.

When comparable groups in this series are analyzed in the control series it is found that there were thirty-five cases with twenty deaths (mortality 57.1 per cent) among the cases graded as severe, and three deaths among forty-eight cases graded as moderate (mortality 6.2 per cent). The combined mortality of the severe and moderate cases was 27.7 per cent. It is recognized that the treated and control groups are not strictly comparable and further that there is a possibility that the more severe cases may have been selected for the ephedrine treatment.

TABLE I

COMPARISON OF BULBAR CASES TREATED WITH EPHEDRINE WITH CASES TREATED SYMPTOMATICALLY

	TOTAL	DISCHARGED			DIED	PER CENT MORTALITY
		NOT PARALYZED	IMPROVED	UNIMPROVED		
No. Cases Treated With Ephedrine	66	4	22	2	38	57.6
Moribund	11		1		10	90.9
Severe	32		10		22	68.7
Moderate	23	4	11	2	6	26.1
Mild	0					0
No. Control Cases	111	7	60	15	29	26.1
Moribund	7		1		6	85.7
Severe	35	1	10	4	20	57.1
Moderate	48	4	36	5	3	6.2
Mild	21	2	13	6	0	0

However, even though the factor of human error in estimating the degree of severity is taken into consideration, the above figures would not seem to warrant the conclusion that ephedrine is of value in the bulbar type of poliomyelitis.

The fact that 84.2 per cent of the deaths in the ephedrine-treated cases occurred in the first forty-eight hours after treatment as compared with the 62.0 per cent mortality in the control group, affords corroborating evidence of the failure of ephedrine to control the cause of the disease in the bulbar type of case. (Only seven cases without bulbar involvement were treated with ephedrine. Of these, five died, a mortality rate of 71.4 per cent.)

It has been mentioned that in eight cases the cisternal route was employed. There are many favorable comments in the literature upon the use of cistern puncture for various neurologic conditions, its advocates claiming that it is a perfectly safe procedure accompanied with less frequent and less severe headaches and general reaction than with lumbar puncture.

It is impossible, however, to escape from the fact that anatomically there is a very small margin of safety in this procedure, the end of the needle, even when the technic is perfect, being less than one centimeter from the vital centers in the medulla. Further, in poliomyelitis,

we are dealing with an extremely hyperemic disease, and the danger of severe hemorrhage from small vessels is perceptibly greater than in most other neurologic conditions.

Postmortem examinations on several cases so treated at the Willard Parker Hospital during the 1931 epidemic offer fairly convincing proof that there is a considerable element of danger in this procedure. The following case illustrates the contraindication to such a procedure:

CASE 5148.—R. T., male, aged ten years, was admitted to Willard Parker Hospital August 31, 1931, on the second day of illness. History of headache, difficulty in swallowing, nasal twang. On admission: temperature, 103.8° F., pulse 140, respiration 34; boy acutely ill, had great difficulty in swallowing; no respiratory difficulty; no paralysis of extremities. Spinal tap, 288 cells, lymphocytes predominating. September 1 (1 P.M.) cisternal tap, 45 c.c. clear fluid under increased pressure; 1½ gr. ephedrine instilled; patient suddenly cyanotic (5:30 P.M); oxygen administered; (7:45 P.M.) breathing, rapid and shallow; pulse, rapid; temperature 107.6° F. Patient died (10:20 P.M.). Autopsy showed typical poliomyelitis, marked engorgement of brain, and blood clot, found between the medulla and the cerebellum, probably resulting from a previous cisternal puncture.

SUMMARY

The foregoing analysis offers no proof that the intrathecal injection of ephedrine sulphate is of value in the treatment of bulbar type of poliomyelitis. The injection of the drug by the cisternal route may be attended by considerable danger.

REFERENCES

1. Meltzer, S. J.: New York M. J. **104**: 337, 1916.
2. Heyne, A. L., and Cepelka, F. P.: J. A. M. A. **67**: 666, 1917.
3. Le Boutillier, T.: Am. J. M. Sc. **153**: 188, 1917.
4. New York City Department of Health: Monograph Series No. 16, 1917.
5. Weisenburg, T. H.: M. Clin. North America **1**: 393, 1917.
6. Brahdy, M. B., and Scheffer, I. H.: Arch. Int. Med. **45**: 102, 1930.

SPORADIC POLIOMYELITIS

(A Study of 200 Cases)

V. Clinical Studies in Poliomyelitis

John Fitch Landon, M.D.
New York, N. Y.

IT IS the purpose of this paper to present an analysis of 200 sporadic, or inter-epidemic cases, of poliomyelitis admitted to the Willard Parker Hospital from 1926 to 1932 (not including 1931) and to compare the results of this analysis with those of the New York Department of Hospitals Committee,[1] who exhaustively studied 2,402 cases observed at the Willard Parker, Kingston Avenue, Queensboro, Riverside and Richmond Borough Hospitals during the 1931 New York City epidemic.

The case occurrence and mortality by years is as follows:

YEAR	CASES	DEATHS	MORTALITY
1926	12	1	8.33%
1927	74	9	12.16%
1928	57	18	31.6 %
1929	4	0	0 %
1930	5	0	0 %
1932	46	9	18.7 %
Total	200	37	18.5 %

The identification of sporadic poliomyelitis with the epidemic form was questioned by early writers on this subject. In 1913, however, Wickman[2] declared his belief that sporadic and epidemic poliomyelitis were one and the same condition and gave reasons substantiating his opinion after reviewing critically the objections to this theory. His statement is of sufficient importance, interest, and clarity to warrant its inclusion. It will be noted that he employs the term "infantile paralysis" to indicate sporadic poliomyelitis, and "Heine-Medin's disease" in place of the now universally accepted term "epidemic acute anterior poliomyelitis."

It may not be inappropriate to refer here to the relation between epidemic and acute poliomyelitis. Some assert that both conditions are not identical. The following are the principal reasons for this assertion: (a) the clinical picture of Heine-Medin's disease is much more variable than that of the classical infantile paralysis; (b) in a number of cases of the former disease the cranial nerves are specially involved, whereas cranial lesions usually do not occur in infantile paralysis; (c) adults are more apt to be attacked in epidemic poliomyelitis; (d) sporadic poliomyelitis seldom runs a lethal course, whereas the epidemic variety has a considerable mortality; (e) and, finally, the epidemic occurrence itself is a characteristic distinction.

The difference in symptomatology is more apparent than real. Obviously very different opportunities for clinical observation exist when hundreds of cases can be examined together than when only isolated cases are available from year to year. In epidemics, connections can be clearly traced between symptom complexes, which in isolated cases may appear unrelated, and the fact must be emphasized that the spinal type (the classical infantile paralysis) forms the nucleus of Heine-Medin's disease. From the most recent observations as to the localization of the paralysis, it is evident that the extremities—especially the legs—are oftenest affected. No doubt of the complete correspondence of the disease with the ancient infantile paralysis can endure. The changes in the acute and chronic stages have been shown to be absolutely identical in both. Netter and Levaditi have procured further and remarkably interesting evidence. They were able to prove in a case of sporadic acute poliomyelitis in which the acute stage had occurred three years previously, that the serum "in vitro" destroyed the virus of the epidemic poliomyelitis.

I wish nevertheless, to refer here to certain peculiarities of Heine-Medin's disease, and to some circumstances which may explain why the epidemic and the sporadic forms have been regarded as distinct.

Heine-Medin's disease shows a striking variability which is evident not only in the different epidemics; not only in the various foci of the same epidemic; but also even in the different cases within a single focus. Its protean character may be gathered from the reports of different observers. Thus, one observer sees none but the typical; while another, of mature experience, reports a number of atypical cases. I can refer to no better example than Medin, Nonne, and Spieler, who, according to present ideas, had at their disposal very scanty material and yet recorded unusual forms.

Later I shall also show that the prognosis of sporadic acute poliomyelitis and that of epidemic acute poliomyelitis differs relatively less than was formerly alleged; and that the epidemic behavior is in no way distinctive, as was shown by my observations upon the Swedish epidemic, and presents all possible degrees from apparently isolated sporadic to accumulated and more or less pronounced epidemic cases. The map of the distribution of acute poliomyelitis in the Swedish outbreak shows that the disease occurred in foci, within each of which usually a continuity of spread could be demonstrated. Such was the case in those parts of the country in which the disease appeared not in epidemic form but only as isolated sporadic cases. From what I have said there can be little doubt that epidemic and sporadic poliomyelitis are one and the same disease.

It is hardly necessary to state that the views above expressed are now universally accepted, and in the following report substantially corroborated.

It is recognized that the analysis of the 200 cases presented in this report is subject to criticism on the ground that the series is too small to admit of any generalization, especially when comparison is made with the 1931 analysis, which comprised twelve times as many cases as are here reported. However, the sparsity of information concerning the sporadic type of case, and the opportunity of comparing sporadic and epidemic cases in the same locality (and, to a considerable extent, in the same hospital) justifies the present report.

In the following analysis there is little doubt that the cases were all authentic instances of poliomyelitis, since of the 200 patients, 194

were definitely paralyzed, only six cases being diagnosed in the preparalytic stage. (Two of these patients subsequently became paralyzed.) This almost complete absence of the preparalytic type of case indicates that the diagnosis is rarely made before the occurrence of paralysis, except during an epidemic.

The 200 cases which constitute this report were analyzed according to mortality and symptoms by various age groups and by signs according to age groups. Other tabulations included the number of cases by day of illness admitted to the hospital, deaths by day of disease, the distribution of paralyses and corresponding mortality, and the relation of the presence of eye signs to mortality. The age distribution and mortality rate are shown in Table I.

TABLE I

AGE DISTRIBUTION AND MORTALITY

AGE	NO. CASES	MORTALITY
Under 1 yr.	8	0
1- 2 yr.	20	0
2- 3 yr.	24	4
3- 4 yr.	25	2
4- 5 yr.	31	5
5- 6 yr.	9	2
6- 7 yr.	13	4
7- 8 yr.	14	2
8- 9 yr.	16	5
9-10 yr.	5	2
10-14 yr.	19	5
15-19 yr.	11	4
Over 20 yr.	5	2
	200	37

Of the 200 cases, 37 died, a mortality rate of 18.5 per cent. This compares favorably with the 12.36 per cent death rate in the 1931 report, especially when the fact that in the recent epidemic nearly one-quarter of 2,402 authentic cases analyzed were diagnosed in the preparalytic stage, the fatality in the preparalytic cases being relatively much lower. In general, the mortality is highest in years of low prevalence, and lowest in years of high prevalence. It is of interest to note that in the 1916 New York City epidemic, so far as can be determined from the published figures,[3] only 134 cases out of a grand total of 8,914 cases were definitely diagnosed as preparalytic, the nonrecognition of this stage of the disease undoubtedly contributing to the high death rate in that epidemic (26.96 per cent).

In this analysis 116 males were attacked (58 per cent) as compared with 82 females (42 per cent). This is in close accord with the 1931 epidemic figures, in which 57.45 per cent of the cases were males and 42.55 per cent females.

Of 194 cases where the color was stated, there were 92.2 per cent whites and 7.1 per cent negroes. The mortality rate among the whites was 19.2 per cent; in the blacks, the death rate was 14.3 per cent. In the 1931 epidemic the incidence of whites was 95.67 per cent and of blacks 3.08 per cent (the remainder consisting of other races and of cases where the color was not recorded). The mortality rate for the whites was 12.5 per cent and for the blacks 6.5 per cent. In short, the incidence and the mortality for the black race was over twice as great in the inter-epidemic cases as in the 1931 epidemic. However, the number of sporadic cases is too small to permit the attaching of much significance to these findings.

Where the onset was recorded, 54.8 per cent were attacked suddenly while 45.2 per cent had a gradual onset. This is approximately in accord with the figures of the 1931 New York Department of Hospitals analysis, where, in the cases in which the type of onset was stated, 62.80 per cent were attacked suddenly, and 37.20 per cent had a gradual onset.

A history of fever was recorded in 171 cases, vomiting in 87 cases, local pain (i.e., pain in a muscle, etc.) in 56 cases, headache in 53 cases and irritability in 27 cases. This sequence of occurrence corresponds closely to that of the 1931 observations, differing chiefly in the fact that in the last epidemic headache (1,025 cases) took precedence over local pain (571 cases). In the 1916 epidemic "of 1,500 cases studied with particular care" fever was present in 53.8 per cent and vomiting occurred in 31.7 per cent of the cases.

In the present series, other symptoms, such as sore throat, restlessness, constipation, chill, convulsions, coryza, and cough occurred relatively infrequently (Table II).

TABLE II

SYMPTOMS

Onset		Irritability	27
Sudden	103	Restlessness	11
Gradual	85	Convulsion	2
Fever	171	Headache	53
Chill	6	Sore Throat	21
Vomiting	87	Local Pain	56
Diarrhea	1	Coryza	11
Constipation	10	Cough	7

TABLE III

PHYSICAL SIGNS

Temperature			
Above 102° F.	35	Injected Throat	37
Under 102° F.	165	Rigidity of Neck	91
		Rigid Spine	39
Prostration			
Marked	54		
Slight	84		

Passing to a consideration of the objective evidence of the disease, i.e. the signs, (Table III) it is found that 17.5 per cent of patients on admission to the hospital had a temperature over 102° F., 82.5 per cent under 102° F. This is in fair accord with the figures of the 1931 epidemic in which of the recorded temperatures, 25.3 per cent were over 102° F. and 74.7 per cent under 102° F. In the present study in 39.2 per cent of the cases, prostration, where recorded, was marked and in 60.8 per cent, slight; injection of the throat was a prominent sign, being recorded in nearly half the cases (ninety-eight). The tonsils were reported as removed in thirty-seven cases, the incidence naturally becoming higher the older the patient. Rigidity of the neck occurred in ninety-one cases and rigidity of the spine, in thirty-nine cases. In the 1931 epidemic also, rigidity of the neck was noted approximately two and one-half times as frequently as rigidity of the spine.

A consideration of the day of illness on which the patient was admitted to the hospital reveals that the greater number came under observation on the fourth and seventh days of illness. This late admission, particularly when compared with the earlier admission of the epidemic cases (third and fourth days) in the 1931 epidemic, affords illuminating evidence of the difficulty in making an early diagnosis in the absence of an epidemic. All patients (with six exceptions) had evident paralysis when admitted.

The number of deaths (thirty-six), when subdivided according to day of disease on which death occurred, is too small to permit the drawing of conclusions. There were seven deaths on both the fourth and seventh days after onset; five on the fifth day; and four on both the third and eighth days. It is interesting to observe, however, that in general the mortality advanced with age. In patients less than six years old the death rate was 11.9 per cent (in 117 cases—13 deaths) whereas in patients older than six years the mortality was 28.9 per cent (in 83 cases—24 deaths). This is in accord with the findings of the 1931 Committee, who found that there was a much higher death rate in the older age groups (mortality under six years, 9.76 per cent; over six years, 18.20 per cent).

A consideration of the distribution of paralysis and accompanying mortality revealed that 6.5 per cent of the patients had paralyses of the upper extremities alone with no deaths; 38.5 per cent had paralyses of the lower extremities alone, with a mortality of 13 per cent; and 10.5 per cent had involvement of the ninth and tenth nerves with a death rate of 33.3 per cent.

Two facts are evident from the foregoing: 1. That involvement of the upper extremities occurs with much less frequency than paralysis of the lower extremities. In the 1931 epidemic, as in previous epi-

demics, this disproportion was also noted. In 6.5 per cent of the cases paralyses of the upper extremities alone occurred, with an incidence of 38.15 per cent for the lower extremities alone. Coupled with the fact that all but 6 of the 200 cases under consideration were admitted with patent paralysis, the above furnishes corroborating evidence that in nonepidemic times, the diagnosis is made only upon the appearance of paralysis, since, when the history is obtained from comparatively ignorant parents, the inability of the young child to walk is probably evident a considerable time before any disability of the arm is noted. 2. Evidence is also furnished that death much more commonly accompanies involvement of the ninth and tenth nerves (bulbar). Additional proof of the relation of a higher mortality rate to involvement of the cranial nerves is furnished in this series by a consideration of the eye signs. Of fifteen cases presenting nystagmus, seven died (46.6 per cent); and in four patients in whom the pupils were unequal, three died (75 per cent), the total death rate being 52.6 per cent.

In the 1931 epidemic there were thirty-two cases in which nystagmus was recorded, thirteen of whom died (40.62 per cent); inequality of the pupils was noted in twelve cases, six of whom died (50 per cent).

SUMMARY

1. Two hundred cases of sporadic poliomyelitis have been analyzed. The fact that only six cases were admitted to the hospital without paralysis is evidence of the difficulty of making a diagnosis of preparalytic poliomyelitis in inter-epidemic years. Further indication that in inter-epidemic times a diagnosis is made in the preparalytic stage with great infrequency is furnished by the fact that the sporadic cases came under observation at a later stage of the disease than the epidemic cases. In addition the less frequent involvement of the upper extremities as compared with the lower extremities affords possible corroborating evidence of the difficulty of establishing a diagnosis of preparalytic poliomyelitis in inter-epidemic times.

2. These cases were analyzed according to (a) mortality, (b) symptoms by various age groups, (c) signs according to age groups, (d) number of cases by day of illness admitted to the hospital, (e) deaths by day of disease, (f) distribution of paralysis and corresponding mortality, and (g) the relation of the presence of eye signs to mortality.

3. The results of the analysis of these sporadic cases are compared with the 1931 epidemic cases as presented in the report of the Committee of the New York City Department of Hospitals. The following facts are noted:

The mortality in the sporadic cases is slightly higher, probably due to the nonrecognition of the preparalytic type of case.

A close correspondence between sporadic and epidemic cases is found when these cases are analyzed according to (a) type of onset (sudden or gradual), (b) percentage and sequence of symptoms and signs, (c) distribution of paralyses and accompanying mortality, and (d) the death rate in cases having bulbar involvement.

CONCLUSIONS

Sporadic or inter-epidemic poliomyelitis as observed in New York City differs in no essential feature from the epidemic variety.

REFERENCES

1. Acute Epidemic Poliomyelitis: A Statistical, Clinical and Pathological Report of Cases Treated in the Communicable Disease Hospitals of the Department of Hospitals during the 1931 New York City Epidemic. To be published.
2. Wickman, I.: Handb. d. Neurol. (Lewandowsky) **2**: 807, 1911; Eng. trans. Nerv. and Ment. Dis. Monograph Series No. 16, 1913.
3. New York City Department of Health: Monograph Series No. 16, 1917.

2 East Fifty-Fourth Street

THE PREVENTION OF INITIAL LOSS OF WEIGHT IN THE NEWBORN BY THE USE OF A HYDRATING SOLUTION

L. J. Halpern, M.D.
Chicago, Ill.

THE initial loss of weight in the newborn, a phenomenon usually considered as physiologic, has recently been held by Kugelmass[1] and his coworkers to be unnatural, harmful, and largely preventable. It is their opinion that a postnatal period of semistarvation is permitted to exist, the like of which is unparalleled in the rest of the animal kingdom. Symptoms of "birth shock," manifested by stupor, lethargy, anorexia, and hypoglycemia, when not combated immediately after birth, increase the perplexities of the postnatal period already beset with such possibilities as inanition fever, vomiting, diarrhea, and impetigo. The preventive treatment they suggested consists of the administration of an isotonic solution containing 6 per cent gelatin in water, 3 per cent dextrose, and 0.5 per cent sodium chloride. This furnishes 12 cal. to the ounce and is given every two hours for the first three days of life.

Kugelmass reported that when this solution was administered to newborn infants, the initial loss of weight was reduced from the usual 6 to 9 per cent, to 3.4 per cent when given during the day only, and to 1.7 per cent when given day and night. This was accomplished by an average minimum intake of 13 per cent of the solution per body weight in the twenty-four hours, amounting to 160 cal. for the same period. The average initial clotting time of the blood, 8 minutes, was reduced to 3 minutes by the third day; the bleeding time was reduced to less than 1 minute after the second day, and the blood sugar raised to the normal level on about the third day. It was felt that the subsequent progress of these infants was advantageously affected by the administration of the solution.

When the use of this solution was inaugurated in the series of infants reported here, the details were carried out in accordance with a communication from Dr. Kugelmass in March, 1933. One hundred and fifty newborn infants constitute the basis for this report, seventy-five of whom were fed the solution and the remaining seventy-five, the control group, were kept on the regime customary for the hospital concerned. They were all private patients whose periodic examination and feeding problems were left to the pediatric department unless the private phy-

From the Pediatric Departments, Edgewater Hospital and University of Illinois College of Medicine.

sician desired to make some other arrangement. The warmed solution was administered to alternating infants, as far as conditions permitted, after they were cleansed and brought into the nursery, and every two hours during the day and night, thereafter. In some instances the solution was discontinued by the private physician at the end of the first or second day, but in the majority of cases it was purposely continued for the first three or four days. Thus the seventy-five infants treated fall into four groups: nine who received the solution for the first day only; thirty-four who received it for the first two days; twenty-six for the first three days, and six for the first four days. Eighty per cent, therefore, received the solution for the first two or three days of life.

The seventy-five infants who acted as controls were placed at the breast eight hours after birth and from then on at from three- to four-hour intervals. They were wakened for water four hours after birth and between subsequent feedings. One-half ounce of half certified milk and half water, containing 5 per cent dextri-maltose, complemented each breast feeding the first day of life. From one to one and one-half ounces were given the second day and two ounces on the third day. Occasionally an evaporated or powdered milk mixture constituted the complementary feedings; and in a few instances where breast milk was not available, the usual standard milk mixtures were substituted. No record was made of the amount of milk or water taken by the control patients because it was felt that, barring certain individual modifications, the regime outlined is similar to that used in the nurseries of most general hospitals and that the accepted initial loss of weight ranging from 6 to 9 per cent would form a satisfactory basis for testing the efficiency of the hydrating solution.

The average birth weight of the seventy-five treated infants was 7.56 pounds, compared to 7.17 pounds for the controls. The average initial loss of weight in the former was 4.84 ounces, or 3.94 per cent of birth weight, compared to 5.77 ounces, or 5.08 per cent, for the controls. An average reduction of 1.14 per cent in the initial loss of weight was thus obtained in the seventy-five treated infants (Table I). More accurate comparisons, however, are made when the infants are considered in groups according to the number of days they received the solution. The thirty-four infants, almost half of the treated series, who received the solution for the first two days, had an initial loss of weight averaging 4.39 ounces, or 3.68 per cent. This is comparable to the 3.4 per cent reduction obtained by Kugelmass when the solution was given during the day only, but it does not reach the minimum of 1.7 per cent he obtained when the solution was given day and night, as was done in the experiment reported here. An average reduction in initial loss of weight of 1.4 per cent was obtained in the thirty-four infants. Except for the slightly better decrease to 3.29 per cent obtained in the small group of

TABLE I

COMPARATIVE RESULTS IN THE INITIAL LOSS OF WEIGHT IN 75 CONTROL PATIENTS AND IN 75 NEWBORN INFANTS FED THE HYDRATING SOLUTION

DAYS OF ADMINISTRATION	NO. OF NEWBORN INFANTS	AVERAGE BIRTH WEIGHT	AVERAGE OZ. INTAKE OF SOLUTION	AVERAGE INITIAL LOSS OF WEIGHT OUNCES	PER CENT	NO. SHOWING NO INITIAL WEIGHT LOSS
Newborn Infants Fed the Hydrating Solution						
First	9	7 lb., 12 oz. (3,734 gm.)	7.86	4.27 (128 gm.)	3.29	1
First Two	34	7 lb., 6 oz. (3,566 gm.)	24.32	4.39 (131 gm.)	3.68	1
First Three	26	7 lb., 10 oz. (3,672 gm.)	39.18	5.46 (163 gm.)	4.32	1
First Four	6	7 lb., 8 oz. (3,609 gm.)	59.90	5.41 (162 gm.)	4.60	0
Total	75	7 lb., 8½ oz. (3,628 gm.)	28.75	4.84 (145 gm.)	3.94	3
Newborn Infants Fed Breast Milk Plus Complementary Mixture						
Total	75	7 lb., 2½ oz. (3,441 gm.)		5.77 (173 gm.)	5.08	1

nine infants who received the solution for the first day only, the thirty-four infants showed a greater reduction in the initial loss of weight than did the twenty-six infants who received the solution for the first three days with an average loss of 4.32 per cent, or the six infants fed the solution for four days with an average loss of 4.60 per cent (Table I).

Fifty-six per cent of the treated infants, irrespective of the number of days that they received the solution, recovered their birth weight in an average of 5.6 days of life. This is 1.3 days earlier than the average of 6.9 days of life by which time 50 per cent of the controls recovered their birth weight. Of the thirty-four infants who received the solution for the first two days, twenty-two infants, or 64 per cent, recovered their birth weight in an average of 5.4 days of life. Of the twenty-six infants fed the solution for three days, 46 per cent recovered their birth weight in an average of 6.4 days of life.

The seventy-five treated infants who received the solution the first day of life, had an average intake of 8.9 ounces, or 7.1 per cent per average birth weight. This averages 106.8 cal. for the day. The infants who acted as controls in the series reported by Kugelmass took an average of 1 per cent of fluid, containing 79.5 cal. for the first day of life for an average weight of 7.5 pounds. Of the seventy-five newborn infants reported here, sixty-six received the solution on the second day of life. Their intake averaged 11 per cent of their average birth weight, or an average of 161 cal. for the second day. Similarly, Kugelmass' controls took 4 per cent of fluid and 114 cal. on the second day of life. On the third day of life,

TABLE II

A COMPARISON OF THE AVERAGE DAY AND PER CENT OF RECOVERY OF BIRTH WEIGHT IN 75 CONTROLS AND IN 75 NEWBORN INFANTS FED THE HYDRATING SOLUTION

DAYS OF ADMINISTRATION	NO. OF NEWBORN INFANTS	DAY OF LIFE BIRTH WEIGHT RECOVERED									AVERAGE DAY BIRTH WEIGHT RECOVERED	NO. SHOWING NO INITIAL WEIGHT LOSS
		3	4	5	6	7	8	9	(NO.)	(PER CENT)		
Newborn Infants Fed the Hydrating Solution												
First	9	1	1			1	1		4	44	5.5	1
First Two	34	2	5	4	7	2	1	1	22	64	5.4	1
First Three	26	1	1	1		7	2		12	46	6.4	1
First Four	6		1	1	1			1	9	66	6.0	0
Total	75								42	56	5.6	3
Newborn Infants Fed Breast Milk Plus Complementary Mixture												
Total	75	1	2	6	7	6	4	12	38	50	6.9	1

thirty-two of the original seventy-five infants received the solution and took an average of 13 per cent of the solution per average weight, amounting to 189.6 cal. for that day. The six infants who took the solution on the fourth day of life took an average of 16.3 per cent of solution per weight, or 235.2 cal. for the day (Table III). Thus an intake of fluid and calories usually accomplished on the fifth day of life in the control group was obtained as early as the second day of life when the hydrating solution was administered.

TABLE III

FLUID AND CALORIC INTAKE DURING THE RESPECTIVE FIRST FOUR DAYS OF LIFE WHEN THE HYDRATING SOLUTION WAS ADMINISTERED

NO. OF NEWBORN INFANTS	DAY OF LIFE	AVERAGE BIRTH WEIGHT IN POUNDS	AVERAGE INTAKE OF SOLUTION (OUNCES)	AVERAGE INTAKE OF SOLUTION (PER CENT)	AVERAGE CALORIC INTAKE
75	First	7.78	8.9	7.1	106.8
66	Second	7.52	13.4	11.0	161.0
32	Third	7.62	15.8	13.0	189.6
6	Fourth	7.51	19.6	16.3	235.2

Table IV is a comparison of the weights of the 150 infants when they were discharged from the hospital at the end of the ninth day of life. Of the seventy-five treated infants, thirty-two infants, or 42 per cent, showed an average gain, compared to twenty-eight infants, or 37 per cent, of the seventy-five in the control group. Of the former, 56 per cent showed an average loss of 3.44 ounces. Fifty-seven per cent of the control group had an average loss of 3.56 ounces. Thus the advantage of the solution during the short period following the last administration of the solution and preceding discharge, as manifested by their combined average discharge weights, appears but slight when comparison is made with the control group.

TABLE IV

THE EFFECT OF THE HYDRATING SOLUTION ON THE WEIGHTS OF 75 TREATED NEWBORN INFANTS AND 75 CONTROLS ON THEIR DISCHARGE FROM THE HOSPITAL

DAYS OF ADMINISTRATION	NO. OF NEWBORN INFANTS	AVERAGE BIRTH WEIGHT (POUNDS)	GAINED—AVERAGE				LOST—AVERAGE				NEITHER GAINED NOR LOST WEIGHT
			NO.	PER CENT	OUNCES	PER CENT PER BIRTH WEIGHT	NO.	PER CENT	OUNCES	PER CENT PER BIRTH WEIGHT	
Newborn Infants Fed Hydrating Solution											
First	9	7.78	4	44	3.00	2.51	5	55	3.40	2.57	0
First Two	34	7.43	16	47	5.73	4.99	17	50	3.50	2.79	1
First Three	26	7.65	9	34	3.44	2.97	17	65	3.32	2.68	0
First Four	6	7.52	3	50	2.41	2.00	3	50	3.00	2.53	0
Total	75	7.56	32	42	4.28	3.71	42	56	3.44	2.72	1
Newborn Infants Fed Breast Plus Complementary Mixture											
Total	75	7.17	28	37	3.93	3.40	43	57	3.56	2.96	4

SUMMARY

Seventy-five newborn infants received the solution suggested by Kugelmass at intervals of two hours, day and night, immediately following birth. Thirty-four received it for the first two days, twenty-six for the first three days, nine for the first day, and six for the first four days. Seventy-five newborn infants were simultaneously placed on complemented breast feedings. The seventy-five infants who received the solution, irrespective of the number of days they received it, had an average initial loss of weight amounting to 3.94 per cent of the combined average birth weights, compared to a 5.08 per cent loss in the seventy-five controls, making a decrease of the average reduction in the initial loss of weight of the former over the latter of 1.14 per cent. The thirty-four infants who received the solution for the first two days had an average initial loss of weight of 3.68 per cent of the average birth weight, or a reduction in initial loss of weight amounting to 1.4 per cent over the control group. A reduction of 1.79 per cent was obtained in the group of nine infants who were fed the solution for the first day only; the reduction amounted to only 0.76 per cent and 0.48 per cent in the twenty-six and six infants who received the solution the first three and first four days, respectively. Three of the seventy-five infants treated showed no initial loss of weight as compared with one of the seventy-five controls. Birth weight was regained in 6 per cent more of the treated infants and in 18 per cent more of the infants in the group receiving the solution for the first two days than in the control group. Birth weight was recovered on an average of 5.6 days of life, or 1.3 days earlier in the seventy-five treated infants than in the controls. Of the thirty-four infants fed the solution the first two days, birth weight was recovered on an average of 5.4 days of life, or 1.5 days earlier than in control group. An average fluid intake of 11 per cent of the average birth weight and a caloric intake averaging 161 cal. per day was attained on the second day of life, or approximately the amounts taken by the average control patient, on the fifth day of life. Even when the solution was fed the infants for the first day only, their fluid and caloric intake for that day exceeded those of the controls reported by Kugelmass for a similar or longer number of days. When the weights of the seventy-five treated infants at the end of nine days of observation are compared with the controls, a gain over their birth weight in 5 per cent more is found. Since the thirty-four infants who received the solution for the first two days constitute almost half of the treated series, it is significant that 10 per cent more of them showed a gain than the control patients. The average gain was 5.7 ounces, an average of 1.8 ounces more than the controls, 2.3 ounces more than the infants who received the solution for three days, and more than any other group in the treated series.

CONCLUSIONS

1. The hydrating solution advocated by Kugelmass reduced the initial loss of weight in seventy-five newborn infants who received it for from one to four days after birth to 3.94 per cent. The reduction amounted to 3.68 per cent in thirty-four of these infants who received it for the first two days of life.

2. Birth weight was recovered on an average of from 1.3 days to 1.5 days earlier in the treated infants than in a group of seventy-five controls.

3. An average intake of 11 per cent of the solution per birth weight, affording an average of 161 cal., was obtained on the second day of life.

4. A slight benefit resulted from the administration of the solution on the subsequent progress, particularly striking in those infants who received the solution for the first two days only.

5. The administration of the solution for the first two days of life yielded better results from the standpoint of reduction of initial loss of weight, recovery of birth weight, and effect on subsequent progress than when it was given for the first three days, the first day, or the first four days.

REFERENCE

1. Kugelmass, I. Newton; Berggren, Ruth E. L.; and Cummings, Mildred: Am. J. Dis. Child. **46**: 280, 1933.

6355 Broadway

ACUTE CHOLECYSTITIS WITH A GALLSTONE IN A CHILD ELEVEN YEARS OF AGE

J. K. Berman, M.D.
Indianapolis, Ind.

CASE reports are useful so far as they help trace the natural course of a disease process. In this way the life history of that particular entity is evolved; and from this information knowledge as to the etiology and proper therapy may be discovered.

The current textbooks are not replete with examples of gallbladder disease and stones in children (Fraser, Da Costa, Homans). At the Mayo Clinic there have been no cases of gallstones in children under sixteen unless associated with familial hemolytic icterus.[1] In Snyder's article, typhoid fever and its relation to gallstones seemed to be the important consideration. Abt said, "Pathological involvement of the gallbladder during childhood is practically unknown. Gallstone attacks occur so rarely that the records of cases are medical curiosities."[2] Griffith[3] stated, "Very exceptionally gallstones are discovered. Thomson collected six reports of gallstones in the newborn and added another. Still found twenty cases of gallstones in early life to which he added three of his own. In all of these the stones were found in the feces or in the gallbladder at autopsy; ten were in infants stillborn or dying in a few weeks; four in those from three to nine months of age, one in an 'infant'; eight in children from three to fourteen years. Khautz could collect but fifteen cases from medical literature, six of these being in infants.[3] Snyder reported three cases under ten years of age. Reed and Montgomery[4] collected eighteen cases of typhoid fever in children under fifteen who either died from, or were operated upon for, complications arising in the gallbladder. They found only twenty cases of gallbladder disease in children. Eisendrath[11] reported two cases of acute cholecystitis with stones in fifteen-year-old patients. In 1909 Wharton[5] reported a boy, aged thirteen months, with acute cholecystitis. In 1923 Kellog[6] reported gallstones in a girl of eleven. He found sixty-two other cases in the literature. These included[9] Khautz's fifteen but not Reed and Montgomery's. "There are then in the neighborhood of eighty reported cases of gallbladder disease in children from the the case of Gibson made public in 1722 to that of Kellog operated on in 1922—a period of exactly 200 years."[2]

McClendon[8] stated that Potter[9] collected 226 cases of cholecystitis in patients under fifteen years of age. In one hundred, forty stones

From the surgical service of the Indianapolis City Hospital and the Department of Surgery, Indiana University School of Medicine.

were found. In thirty-eight, the presence or absence of stones was not noted. Beals[10] found in the literature sixty cases in thirty of which stones were found. In all but Beals' case, diagnosis was not made preoperatively. Therefore, we may state that there have been reported in the literature about 300 cases of acute and chronic cholecystitis in children of which approximately two hundred had stones.

The case here reported (M. W.) is that of a girl, eleven years old, who came to the Indianapolis City Hospital as an emergency case. Her chief complaint was excruciating pain in the right upper quadrant, persistent nausea and vomiting, and abdominal distention. The child was unable to lie on her right side and could only rest on her back in a semireclining position. Her father was fifty-one years of age. He was a slender man (linear type), who had enjoyed good health until two months ago when he had tularemia. Her mother, forty-five years old, was obese (lateral type). She has had "rheumatism" in her knees, hips, elbows, and hands for the past fifteen years, according to her history. There were three brothers living and well, who were "fleshy," and one sister, who was tall and slender. The child's maternal grandmother had an "abscess of the gallbladder." She also was a very "fleshy" woman, as are most of the maternal and paternal relatives.

This child was a normally delivered baby who weighed 4½ pounds at birth. She was breast fed for five months and then given condensed milk. Her past history was true to the type susceptibilities of Stockard, for as an infant she had pneumonia; and as a linear-type child, she had chickenpox at three years, scarlet fever at five, whooping cough at six, smallpox at six, measles at seven, and many attacks of tonsillitis. At the age of nine she began to gain weight rapidly. (Is this an example of a changed constitutional type resulting from a defective immunologic panel?) But her illness continued, for at this time she began to complain of "pains in her stomach on the right side." They would come on when she became "excited" but would also frequently cause her to cry out in her sleep. Her appetite has been excellent, but she prefers pastries, candies, and fried foods. She has never been jaundiced.

Her present illness began in August, 1933, with severe pain in the upper right quadrant. The family physician had diagnosed it as indigestion due to indiscretion in diet. The attacks would last for about eight hours and then recur from time to time. This attack had been present for four days and was becoming progressively worse.

The patient was a white girl, eleven years old, well nourished, 54½ inches tall, weighing 74 pounds. On arrival in the admitting room she could not lie down because of abdominal pain. Attempts to urge her to do so caused her to cry out. Finally examination was made with the child semirecumbent. Aside from a slight head cold, no abnormalities were noted except in the abdomen which was distended. No peristaltic sounds were heard on auscultation. The entire abdomen was tender on palpation. However the point of maximum tenderness was over a small, but definite mass, in the right hypochondrium. There was marked rigidity of the right rectus muscle.

Her urine was examined and found to contain 4+ albumin with many hyaline casts and an occasional red blood cell. Her blood count revealed a hemoglobin of 65 per cent with 3,950,000 red blood cells. There were 17,100 white cells with 82 per cent polymorphonuclears, 15 per cent small lymphocytes and 3 per cent basophiles. Her temperature was 100° F. by mouth.

We operated upon her through a right upper paramedian incision directly over the mass and found an enormously distended semigangrenous gallbladder. The liver

was enlarged to about 1 inch below the costal margin. Its edge was thick and round, pale and soft in consistency. There was a newly formed mass of adhesions including the omentum which walled in the gallbladder area securely. The gallbladder was now opened, "white bile" was found and aspirated. The cystic duct was completely blocked by a stone about 1½ cm. in diameter. The mucous membrane was acutely inflamed and hemorrhagic. The gallbladder was split down to the cystic duct, and

Fig. 1.—Showing body type of patient, aged eleven years.

the stone was removed. The mucous membrane was cauterized with pure phenol, which was neutralized with alcohol. The gallbladder wall was then turned in over a No. 14 French catheter, and one Penrose drain was placed alongside the line of suture. The appendix was removed but was not involved. Bile did not drain through the tube postoperatively. She made an uneventful recovery and was released from the hospital on the twenty-seventh day. A culture of the "white bile" was made, but the report reveals a probable contamination. The organisms were long, gram-negative chains or filaments (nonmotile).

COMMENT

If we may rely upon the history as given by the child's mother, we must conclude that the patient probably has had cholecystic disease since she was nine years old. I have operated upon a young woman, twenty years old, who has had definite gallstone colic since the age of twelve with a history very similar to the case here reported. Her gallbladder was full of stones. Neither patient has had typhoid fever. It would seem that although the incidence of typhoid is decreasing, yet that of cholecystic disease is increasing. Neither patient has had any jaundice.

Most observers believe that gallstones may be due to stasis, infection, or metabolic disorders (hemochromatosis, familial hemolytic icterus, and other forms of acholuric jaundice). Since stones are found in the newborn, infection could hardly play an important rôle, and the same may be said concerning stasis. This patient gave no history of jaundice so that the third group of causes may be eliminated here.

I believe that a definite constitutional predisposition to gallstones was present in this child. She is an excellent example of the "lateral" type. This predisposition is due to her "idiotypic influences" (heredity) but also to her "heterotypic influences" (environment in its broadest sense).

CONCLUSIONS

1. In children who have vague upper abdominal pains, gallbladder disease should be considered—especially in the fat short child.

2. Gallbladder disease may present itself as a surgical emergency in young children.

3. A case of acute cholecystitis with a stone in the cystic duct is reported in a child, aged eleven.

REFERENCES

1. Amberg, S.: Personal communication to Dr. J. C. Carter.
2. Snyder, C. C.: J. A. M. A. **85:** 31, 1925.
3. Griffith: Diseases in Infancy & Childhood, p. 275, quoted by Snyder.[2]
4. Reed, M. H., and Montgomery, J. C.: Bull. Johns Hopkins Hosp. **31:** 7, 1925.
5. Wharton, H. R.: Tr. Am. S. A. **27:** 540, 1909.
6. Kellog, E. L.: Ann. Surg. **77:** 587, 1923.
7. Von Kautz, A.: Centralbl. f. d. Grenzgeb. d. Med. u. Chir. **16:** 545, 1913 (From Snyder).
8. McClendon, S. J.: Am. J. Dis. Child. **45:** 584, 1933.
9. Potter, Alfred H.: Surg., Gynec. & Obst. **46:** 795, 1928.
10. Beals, J. A.: South. M. J. **21:** 666, 1928.
11. Eisendrath, D.: Ann. Surg. **66:** 557, 1917.
12. Farr, C. E.: Arch. Pediat. **39:** 574, 1922.

HUGE TENSION CAVITY IN PRIMARY PULMONARY TUBERCULOSIS IN AN INFANT

S. Sanes, M.D., and F. E. Kenny, M.D.
Buffalo, New York

THE following case is reported for these reasons: Pathologically, it depicts in a ten-month-old negro, primary pulmonary tuberculosis which closely resembles the so-called adult type of infection, with extensive cavitation, bronchogenic spread, and the absence of acute miliary dissemination. By virtue of its dimensions, the primary cavity in question becomes apparently the largest of its type to which notice has been directed. It is the first tension cavity to be specifically described in an infant. The clinical and roentgenologic reflections of the pathologic findings formed a perplexing picture for diagnostic differentiation. Besides raising the general question of the actual incidence of cavernous pulmonary tuberculosis in infancy, consideration of our case suggests that along with a few similar instances from the literature it may, perhaps, be justifiably grouped into a rare but definite tuberculous syndrome.

REPORT OF CASE

G. W., a negro boy, aged ten months, was admitted to Buffalo Children's Hospital, April 23, 1933, because of fever and vomiting of three months' duration. He died April 25, 1933. The parents and two older children were alive and well. An uncle who had suffered with pulmonary tuberculosis since December, 1932, lived at home and died there one month before the patient's hospital admission. The patient was a full-term baby, delivered by cesarean section. He was breast fed; cod liver oil and orange juice were given at one month; cereal and vegetables were added at eight months. In January, 1933, the infant became ill with a "head cold."

For three months previous to his hospital entry, the patient was thought to have a fever. His appetite was poor; he vomited repeatedly. The emesis was both projectile and regurgitant. The bowels were regular, but stools were of a peculiar greenish color.

Physical Examination.—Examination revealed dehydrated, poorly nourished, negro male infant, crying feebly. Temperature varied from 98.6° F. to 100.3° F., respiration rate was 20/50; pulse, from 100 to 180. Frontal bossae were prominent, and rachitic beading was present. Cervical, axillary, and inguinal nodes were palpable. Respiration, which was labored, revealed retraction of inner spaces and epigastrium. The right upper chest and entire left chest showed impaired resonance, and puerile breath sounds, with many râles and rhonchi. The lower two-thirds of right chest was distinctly tympanitic. Breath sounds here varied. On one examination they were absent, on another audible but suppressed. The heart was rapid; the liver palpable.

From the Pathological Laboratory, Buffalo General Hospital and School of Medicine, University of Buffalo.

Laboratory studies showed hemoglobin 70 per cent (Tallqvist); white blood cells, 19,400, with 79 per cent polymorphonuclear leucocytes, and 21 per cent lymphocytes; Kahn test negative; tuberculin test (1/10 mg.) negative; spinal fluid examination, fluid clear, pressure not increased, albumin one-plus, globulin negative, copper reduction normal; three cells per cubic millimeter.

Fig. 1.

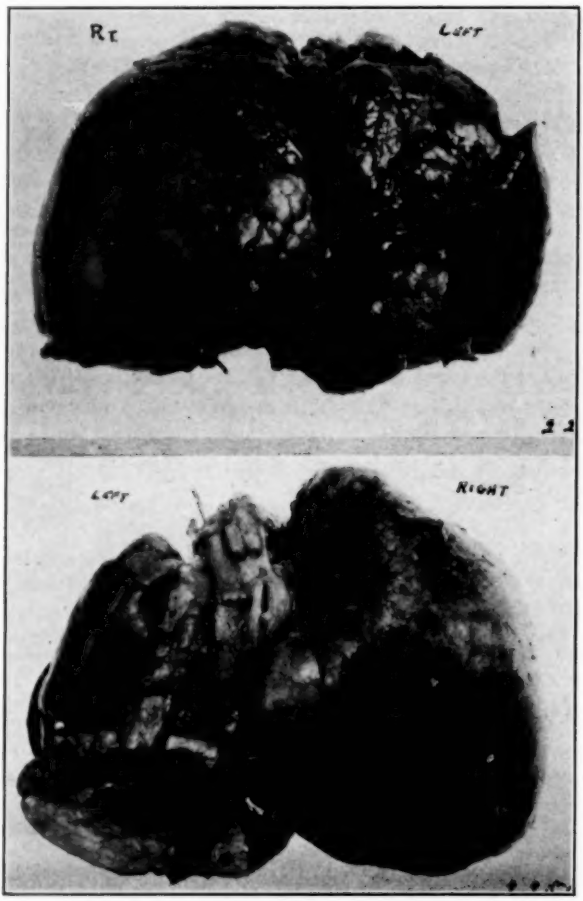


Fig. 2.

Fig. 1.—Anterior view of lungs showing heart covered by right lung.
Fig. 2.—Posterior view of lung which shows huge tense cavity, regional lymph nodes on right side, and displaced mediastinum.

Radiographic examination revealed, in addition to scattered areas of consolidation in both lungs, a large irregular area of translucency in the right lung, simulating loops of intestine. Barium meal and colonic injections caused no filling in this area.

The autopsy was made six hours after death. The anatomic diagnosis was: primary tuberculous tension cavity of practically the entire lower lobe of the right lung with bronchi and vessels tranversing its lumen; open communication of second

order bronchus into cavity, produced by tuberculous destruction of distal portion of bronchus; caseous tuberculosis of right tracheobronchial and right paratracheal lymph nodes; compression atelectasis and tuberculous infiltration of right upper and middle lobes; adhesive fibrinous pleuritis of right lung; focal, caseous bronchopneumonic areas in left upper and lower lobes; low position of right diaphragm; tuberculous ulcers of lower ileum; slight clubbing of fingers; slight rickets; incomplete fissure between right upper and middle lobes; diffuse fatty changes in liver; lipoid poor adrenals.

Description of Thoracic Organs.—Upon removal of sternum the right lung was found markedly enlarged. The heart and other mediastinal structures were pushed to the left side. The anterior cardiac surface was barely visible, for it was covered by the right lung. The right visceral pleura was adherent to parietal and diaphragmatic pleurae by fibrinous adhesions, which could be broken with the finger. The left pleural cavity contained no fluid; there were no adhesions. The right diaphragm was at the level of the seventh rib; the left diaphragm at the level of the fifth rib.

Fig. 3.—Internal view of cavity showing preserved bronchovascular structures, efferent second order bronchus (E.B.) and compression of right upper and middle lobes.

The right lung measured 10.5 × 10.5 × 7 cm. Fissures could not be distinctly seen. The lower lobe was markedly distended. It failed to collapse. On palpation it was resilient. Percussion produced a tympanitic note. The right middle and upper lobes were compressed and nodular on surface. On section the right lung revealed a large cavity replacing almost the entire right lower lobe with apparently complete disappearance of pulmonary parenchyma. The cavity was bilocular. The largest part in the anterolateral portion measured 5.5 cm. in lateral diameter, and 7.5 cm. in frontal diameter; the smaller part in posteromedial portion measured 1 × 1.4 cm. The lumen was filled with "air," and contained caseous material. Stretching across it were numerous small and large tubular and bandlike structures corresponding to bronchi and vessels. The bronchovascular framework and inner walls were irregularly covered by cheeselike granulation tissue. A main bronchus of second order opened directly into the cavity, and continued for a short distance (0.4 cm.); its peripheral extension had been destroyed. The lumen of this still-preserved bronchus was almost totally filled with cheesy material. The wall of the cavity measured 0.2 cm.; the right tracheobronchial and right paratracheal nodes, the largest of which measured 1.7 × 0.8 cm. were caseous, and on section revealed

cheesy cavities. The right upper and middle lobes showed diffuse tuberculous infiltration and atelectasis. The left lung was normal in size. Irregular nodular yellowish areas varying from pea to plum size were found in both left upper and lower lobes. On section these were found to be seats of yellowish confluent pneumonia. Otherwise, the lung crepitated well. Lymph nodes on left side showed gray tubercles, but no caseation. No calcified lesions were found in organs dissected.

Fig. 4

Fig. 5

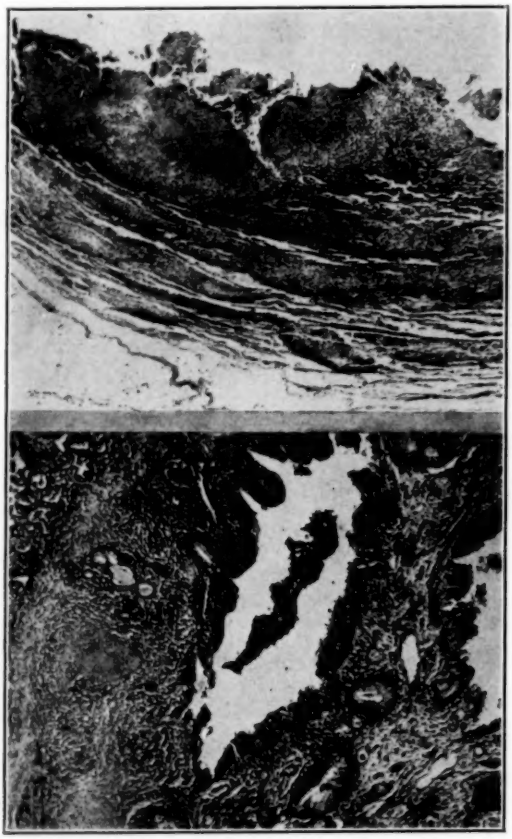


Fig. 4.—Section through wall of cavity. (L.P.)
Fig. 5.—Tuberculous bronchitis with ulceration of mucosa and exudate in lumen. (L.P.)

Bacteriology.—Smears from lung and lymph node revealed quantities of tubercle bacilli.

Histology.—Sections from cavity revealed on inner surface a ragged, ulcerative, tuberculous process with giant cell tubercles. Necrobiosis and necrosis were marked. Scattered throughout were also many leucocytes. The underlying alveoli were compressed. Extensive tuberculosis with many giant cell tubercles was noted in lung tissue. (Fig. 4.) The preserved alveoli were filled with large cells possessing a pale pink cytoplasm and round vesiculated nuclei. Occasionally the cytoplasm was granu-

lar. Some alveolar lumens contained pink staining fluid. Fibrous tissue proliferation was negligible. Ziehl-Neelsen stain was positive for tubercle bacilli; with a Gram stain a few gram-positive diplococci and large bacilli were seen on inner surface of cavity.

Bronchi leading from cavity showed tuberculous bronchitis and peribronchitis with epithelioid and giant cell tubercles in whole wall, especially in mucosa and submucosa, with ulceration of surface epithelium. Lumina contained necrotic material and leucocytes. Isolated tubercles were in a stage of beginning organization (Fig. 5).

Tributary lymph node disclosed extensive caseous tuberculosis involving practically the entire node; a few giant cell tubercles were still seen in capsule.

Scattered tubercles were present in the spleen, but not in the liver or kidney.

COMMENT

In this case the ten-month-old infant did not die of acute miliary tuberculosis but of extensive tuberculous involvement of both lungs. In other words, the course of primary tuberculosis can be compared with that of severe progressive pulmonary tuberculosis in reinfected (or superinfected) adults and children. Cavitation, bronchogenic spread and pleuritis were the outstanding features. Even the changes in the regional lymph nodes were less in intensity than in the primary parenchymal lesion. Grossly, acute miliary dissemination could not be demonstrated. Histologically, only the spleen showed isolated tubercles; the liver and kidneys were free in examined sections. Although the brain was not examined, a normal cell count in the spinal fluid excluded the possibility of meningitis.

Analogies between the course of our pathologic observations and those of postprimary infection, made in general terms, appear entirely justified. In drawing morphologic parallels, however, we realize that certain distinctions ought to be pointed out. Upon first glance the size of the cavity, the bronchogenic spread, and the relatively slight enlargement of the tracheobronchial lymph nodes favored the resemblance to chronic ulcerative tuberculosis. After close appraisal any similarity seemed more properly stressed in relation to the acute phthisis of adults and children because of the ragged interior of the cavity, its site and thin wall, the bronchopneumonic consolidation, and the lack of fibrous tissue formation.

To explain the pathogenesis of our pulmonary findings, it seems reasonable to formulate the following sequence of events. The first tuberculous infection occurred in the right lower lobe; here a large and expanding primary focus, which showed tuberculous bronchopneumonia, was formed. Almost concomitantly the regional tracheobronchial and paratracheal lymph nodes developed so-called "complex changes." In a short time the primary bronchopneumonic focus as well as the regional lymph nodes underwent caseous conversion. There was a virtual melting of the parenchyma and peripheral part of the second order bronchus;

communication with the tracheobronchial tree was established. By repeated coughing and emesis, caseous areas of the primary focus were ejected into trachea and bronchi, and thence in part aspirated into other portions of the lung. Thus a cavity formed in the right lower lobe, and bronchogenic lesions arose in right upper and middle lobes, and left lung. From these last lesions infection traveled to respective tributary nodes. In order to give rise to ulcers in terminal portion of ileum, much of the caseous material evacuated into bronchi must have also been swallowed. Some of it remained lodged in the efferent bronchi of the cavity; the bronchial lumen was obturated in subtotal manner and tuberculous bronchitis was set up.

The marked gaseous distention of the cavity reported calls for special explanation. Heretofore, no mention has been made of a gradually increasing content of air in a cavity in infancy, under certain bronchial conditions. Though manometric readings were not taken in our case, the assumption that the cavity contained gas under a pressure in excess of the atmospheric pressure is borne out by every observation. Clinically, the lower two-thirds of the right chest was tympanitic. Roentgen films showed a large translucent area resembling intestine filled with gas. At autopsy the cavity, though thin walled, did not collapse, but remained tense and resilient. Exertion of pressure on adjacent structures could be evidenced by compression atelectasis of right upper and middle lobes, low position of right diaphragm, and displacement of heart and mediastinum to left side.

To our minds the term "tension cavity" or "tension pneumocavern" appropriately designates the cavernous condition just described. Such a condition can be satisfactorily attributed to the one-way valvular mechanism which was brought about through subtotal bronchial obturation by caseous material especially of the second order bronchus leading from cavity. Active efforts of inspiration with dilatation of bronchi forced air into cavity against partially obstructing exudate. The movements of expiration were not powerful enough to force out an equal amount of air; contraction of bronchi further reduced the caliber of their lumina. Absorption of oxygen by the blood was probably not in direct ratio to its ingress while carbon dioxide entered cumulatively from the blood stream. With destruction of pulmonary parenchyma the right lower lobe had lost its elasticity. Finally, the lower lobe was more or less fixed to the parietal and diaphragmatic pleurae by rather firm fibrinous adhesions. Through physiologic necessity, then, gas accumulated in the cavity under increased pressure.

How far the gradually increasing air content in the cavity determined its large size, or even possibly the rapidity of its formation must be a matter for conjecture. Pearson[1] believed that a positive pressure of gas within a tuberculous area of softening or within a formed cavity helps

to produce excavation. Kellner[2] was of the opinion that the preservation of lobular markings and large vessels bespeaks rapid cavity formation. Merritt[3] reported several cavities spanned by bronchi and vessels. A ragged internal appearance is also thought to characterize an acute cavity.[4] Huebschmann[5] assigned an important rôle to secondary bacterial invaders in facilitating cavity formation.

Cavities seemingly of the tension type have been described in adult pulmonary tuberculosis by Malossini,[6] Vaccarrezza,[7] and De Partearroyo.[8] These were of huge size and invariably confused clinically and radiographically with pneumothorax. Coryllos[9] and Pearson[1] proved beyond doubt the existence of tension cavity in adults by puncturing the lung through the chest wall, and measuring the intracavernous pressure. Coryllos[9] also determined the tension of oxygen and carbon dioxide by analysis of the gaseous content, and proved that absorption of oxygen takes place through the wall of the cavity and that carbon dioxide enters through the blood stream. He stated that healing could not take place as long as the efferent bronchus was partially obstructed.

As a result of widely fostered classifications, clinicians have generally come to believe for diagnostic uses that cavity formation is characteristic of the adult type of tuberculosis and not of the primary infection. Yet, the frequency of cavernous lesions in primary pulmonary tuberculosis in infancy is strikingly brought out by necropsy statistics. In 1924 Sipirstein and Baugess[10] compiled thirty-one systematic studies and isolated case reports on infants up to two years, published from 1888 to 1921. Additional literature was abstracted in 1929 by Merritt,[3] and Levin.[11] For practical purposes, nearly all cavities can be considered as belonging to the primary type, i.e., resulting from caseation and sequestration of primary focal lesions. Cavitation, however, does occur occasionally in a secondary, caseous bronchopneumonic lesion. Examining a large series of infants in the first year of life, Ghon[12] found primary cavities in 34 per cent. This figure approximates the average experience.[13, 14, 15, 16] Cavities are rare in patients less than three months old; the incidence increases with age. A preponderance in colored infants stands out in American reports. Usually only one cavity is present; exceptionally two are noted. Schott[17] described one lobe honeycombed with many small cavities but gave no explanation for the genesis of this finding. Merritt[3] reported the right lung and the right lower lobe as the most common sites; Stirniman,[18] the left lung and the upper lobes. Walls of cavities may be irregular, covered with necrotic material, or thin and smooth. Externally, pleuritis is present in over 50 per cent of the cases. Internally, lobular and vascular structures may persist. Hemoptysis is uncommon; pneumothorax,[19] and pyopneumothorax[20] are known to result from rupture through wall.

The majority of primary cavities vary in size from grain to hazelnut. Sometimes a cheesy focus, the size of a hen's egg, is converted into a

cavity. Extraordinarily rare are primary cavities involving the greater part of a lobe or lung. Barbier,[21] Merritt,[3] Farmer,[22] Stirniman,[18] and Levin[11] cite cavities of this extent but furnish no clinical information.

In 1921 Sipirstein and Baugess[10] reported a case of a colored infant, aged two years, with dyspnea, fever and cough. Tubular breathing was heard in right upper chest. Roentgenograms suggested a cavity. The Mantoux test was positive; tubercle bacilli were found in the sputum. At autopsy the upper lobe disclosed a cavity, 4 x 5 cm. Tubercles were present in liver and spleen. Acute miliary tuberculosis was not noted.

In 1924 Farmer[22] described a colored male, aged six months, with irritability, loss of weight, and cough. A high pitched percussion note was elicited in the right posterior chest below the sixth rib. Before death tympany was obtained over the third inner space on the right, anteriorly. A roentgenogram showed a large cavity in the right lung below the level of the third rib anteriorly. Autopsy revealed this cavity involving the entire middle lobe and part of the lower lobe. Otherwise there was chronic tuberculosis of both lungs and a terminal miliary tuberculosis.

In 1924 Poinso[23] briefly mentioned the evolution without definite signs of an enormous cavity in a five-month-old infant. There was apparently no acute miliary tuberculosis.

In 1927 Leenhardt, et al.[24] examined an eleven-month-old infant with fever, anorexia, and diarrhea. The mother was tuberculous; the tuberculin test was negative. Physical examination was practically negative. X-ray examination showed cavitation in right lung. At autopsy a cavity taking up nearly half of the total volume of the right lung, was found. The left lung showed caseous nodules. Acute miliary tuberculosis had not taken place.

In 1929 Czygan[25] described an infant aged eleven weeks, with fever, emesis, cough, and asthmatic breathing. Sputum was positive for tubercle bacilli. Autopsy revealed a cavity involving a large part of right upper lobe. The efferent bronchus contained caseous material. There was no acute miliary tuberculosis; histologically, tubercles were present in liver and spleen. The author stressed the similarity between the findings in her case and those in adult tuberculosis, but made no mention of a positive gas pressure in cavity.

In 1932, Armand-Delille et al.[26] noted an x-ray shadow in right lung of a six-month-old infant with a family history of tuberculosis and with positive sputum. Following artificial pneumothorax the infant developed syncope, and vomited an abundance of yellowish green material. Ensuing roentgenograms showed a large cavity in right lung from fourth to ninth rib, which was verified by postmortem examination. Acute miliary spread was not present.

In 1934, Bronson et al.[27] cited the case of an eight-month-old infant with vomiting, bronchial asthma, and cavernous breathing on the right side. At autopsy the whole middle lobe was replaced by cavity. Death was due to tuberculous meningitis.

In view of its frequent recognition at autopsy cavernous pulmonary tuberculosis ought to receive more serious attention clinically in infancy. Undoubtedly, most cavities are too small to be detected by physical examination; or else a simultaneous and overwhelming miliary tuberculosis obscures the local cavernous lesion. In cases, however, such as the present one and the few other synopses taken from the literature mutually exhibiting a huge cavity without acute miliary dissemination, or with miliary tuberculosis becoming superimposed only shortly before death,

cavernous pulmonary tuberculosis might reasonably be suspected. A history of tuberculous contact, fever, loss of weight, cough, emesis, and asthmatic type of respiration is obtained. The physical signs should depend upon size of cavity, communication with bronchial tree, patency of efferent bronchus, and degree of bronchogenic spread. With a large tension cavity, tympany is elicited. Cavernous, as well as tubular breathing has been noted. If the efferent bronchus is completely obturated, breath sounds are absent; if only partially so, breath sounds are suppressed with prolonged expiration. Clubbing of the fingers may be present. Although in some instances physical examination of the lungs yields little information, roentgenograms practically always show a cavity; persistence of bronchi or vessels in cavity, giving a trabeculated appearance, may cause confusion. The tuberculin test is positive except in late stages and in rapid cavity formation. Tubercle bacilli have been found in the sputum. The differential diagnosis includes pneumothorax, congenital cyst, and diaphragmatic hernia.

SUMMARY

We report a case of primary pulmonary tuberculosis in a ten-month-old negro infant, the pathologic features of which—cavitation, bronchogenic spread, and absence of acute miliary dissemination—resembled those of postprimary tuberculous infection. The primary cavity in this case was of singularly large size, and is the first tension cavity to be specifically described in an infant. Clinically, the cavity showed distinct tympany. The literature on cavernous pulmonary tuberculosis in infancy is summarized; attention is directed to a small group of cases with findings similar to ours, that seems to constitute a rather typical clinicopathologic syndrome in primary pulmonary tuberculosis.

An abstract of this paper was read before the Buffalo Pathological Society, April 29, 1933. We are indebted to Dr. K. Terplan for suggestions and criticism to which this paper owes its completion. Dr. V. I. E. Henry obtained the clinical data.

REFERENCES

1. Pearson, S. V.: Brit. M. J. **1**: 380, 1930.
2. Kellner, F.: Beitr. z. Klin. d. Tuberk. **63**: 141, 1926.
3. Merritt, K.: Am. J. Dis. Child. **38**: 526, 1929.
4. Boyd, Wm.: Pathology of Internal Diseases, p. 223, New York, 1931, Lea & Febiger.
5. Huebschmann, P.: Beitr. z. Klin. d. Tuberk. (Beihefte) Path. Anat. der Tuberk. **5**: 247, 1928.
6. Malossini, S.: Riv. di pat. D'App. Resp. **1**: 113, 1932.
7. Vaccarrezza, R. F.: Semana Med. **2**: 668, 1929.
8. De Partearroyo, F.: Rev. méd. de Barcellona **9**: 488, 1928.
9. Coryllos, P. N.: Am. Rev. Tuberc. **28**: 1, 1933.
10. Sipirstein, D. M., and Baugess, H.: Am. J. Dis. Child. **27**: 586, 1924.
11. Levin, A.: Vopr. Tuberk. **7**: 1269, 1929.
12. Ghon, A.: Ztschr. f. Tuberk. **43**: 3, 1925.
Ibid: and Kudlich, H.: Handbuch d. Kindertuberk. **1**: 54, 1930.
13. Comby, J.: Traite des maladies de l'enfance Paris, 1920, quoted by Merritt.
14. Geippel: quoted by Levin.[11]
15. Wollstein, M., and Bartlett, F. H.: Am. J. Dis. Child. **8**: 362, 1914.

16. Blumenberg: Beitr. z. Klin. d. Tuberk. **62:** 532, 1926.
17. Schott, A.: Beitr. z. Klin. d. Tuberk. **48:** 112, 1921.
18. Stirniman: Jahrb. f. Kinderh. **11:** 756, 1905.
19. Shoenstein, E.: Pediatria **29:** 535, 1921.
20. Ross, S. D., and Cowdry, C. T.: Am. J. Dis. Child. **27:** 456, 1924.
21. Barbier, H.: Rev. de la tubere. **9:** 507, 1928.
22. Farmer, H.: Am. J. Roentgenol. **12:** 327, 1924.
23. Poinso, G. et al.: Presse méd. **51:** 550, 1924.
24. Leenhardt, et al.: Bull. de la soc. de Sciences Medicales Montpellier, **8:** 224, 1927.
25. Czygan, E.: Arch f. Kinderh. **87:** 208, 1929.
26. Armand-Delille et al.: Bull. Soc. de pediat. de Paris **30:** 652, 1932.
27. Bronson et al.: Am. J. Dis. Child. **47:** 104, 1934.

LYMPHATIC LEUCEMIA RESEMBLING RHEUMATIC FEVER IN A CHILD

Report of a Case

Lucy Porter Sutton, M.D., and Olive Bosworth, M.D.
New York, N. Y.

BECAUSE of the variety of symptoms which accompanies the onset of acute leucemia in children, the diagnosis is often obscure. Especially confusing is the complication of swollen, tender joints with a clinical picture resembling rheumatic fever. The few cases contained in the following summary of the literature bear a striking resemblance to one another and to the case we are presenting.

J. V. Cooke[1] (1933) reports rheumatoid pain as the most prominent symptom in six out of fifty cases of acute leucemia. He describes one of the cases, in a fourteen-year-old boy who had pain but no swelling in the muscles and legs, as well as lesions which resembled subcutaneous rheumatoid nodules. He does not report the other five cases in detail.

Carl H. Smith[2] (1933) reports a three-year-old child with pain and swelling of the joints, a blood picture showing a myeloid leucemia with marked leucopenia and roentgenograms of the bones showing characteristic changes in the cortex and periosteum. This case came to autopsy. Smith bases his differential diagnosis from rheumatic fever on the fact that the joints did not respond to salicylates, but did respond to blood transfusions. He cites three other cases from the literature, as follows: 1. Taylor's case (1926) was one of a boy, aged two years and ten months, who had swollen tender extremities, the roentgenograms of which showed bone involvement similar to Smith's case. The diagnosis of lymphatic leucemia with aleucemic periods was confirmed at autopsy. 2. Karelitz' case (1927) was one of a three-year-old boy with myeloid leucemia, painful swollen joints, and similar roentgenogram findings. 3. Hunter's case (1927) was in a four-and-a-half-year-old boy with swollen knees and ankles, leucopenia and blood picture of lymphatic leucemia. The diagnosis was confirmed at autopsy. No roentgenograms were reported in this case. Poynton and Lightwood[3] (1932) report a case of a three-and-a-half-year-old girl who had joint symptoms for seven weeks before death, an aleucemic blood picture of the lymphatic type, and characteristic roentgenogram findings of periosteal changes produced by subperiosteal leucemic infiltration, verified at autopsy. Lucas and Wash-

From the Department of Pediatrics, New York University, and the Children's Medical Service of Bellevue Hospital.

burn[4] (1930) stress particularly the diagnostic value of roentgenograms in their description of an eight-year-old boy in whom an aleucemic type of lymphatic leucemia was found. His chief symptom was pain and tenderness of the extremities which he referred to the joints.

In the following case from the Children's Medical Service at Bellevue Hospital, New York City, the predominating feature was the recurrent joint symptoms which masked the true nature of the disease for six

Fig. 1.—Right radius and ulna, Dec. 3, 1929. Lower ends of ulna and radius show decreased density. The bone ends are regular and sharply demarcated, and show slightly increased density and thickness. In the osteoporotic areas there are blotchy areas of increased density. The ulna shows raised periosteum. Finger and carpal bones normal.

months during two admissions to the ward and persisted throughout the remaining six months of life. The clinical picture was atypical enough to cast doubt upon the initial diagnosis of rheumatic fever, for it was felt that in so young a child an extensive and protracted polyarthritis should be accompanied by a severely damaged heart, a factor which was lacking in this instance. The child was admitted three times in the

course of one year for pain and swelling of various joints. It was not until the third admission, when a generalized lymphadenopathy was also present, that the diagnosis was made of acute leucemia.

D. O'C., a white girl, aged two years and eight months, was first seen December 27, 1929. She complained of pain and swelling of the right forearm and wrist; she had had similar pains in the left shoulder two months previously. Her past history was entirely irrelevant. Examination on admission revealed a well-developed child not acutely ill, with palpable lymph nodes, enlargement of the right epitrochlear node and swelling of the right wrist, which was connected with the lower end of the radius or ulna rather than the joint. There was limitation of motion and slight

2-*B*. 2-*B*.

Fig. 2.—A. Left humerus, Jan. 13, 1930. No changes in humerus.
B. Left humerus, 7-13-30.—Lower end of humerus shows decreased density with blotchy areas of increased density.

wrist drop. The heart was negative; liver and spleen not palpable. Two blood counts were essentially normal with hemoglobin 82 per cent, red blood cells, 4,900,000, and white blood cells 7,200, polymorphonuclear cells 50 per cent. Roentgenogram findings of right arm and wrist were reported: "Moderate degree of halisteresis. Evidence of metaphysitis." Diagnosis of rheumatic fever was suggested but not confirmed. She was discharged improved in ten days.

Her second admission was six days later, January 16, 1930, for pain and swelling of the left foot. This condition had been present for a day. Examination showed the left ankle to be hot, swollen, and tender, and the left inguinal nodes enlarged. The heart was not enlarged or overacting, which again made rheumatic polyarthritis a doubtful diagnosis. She had a fever of 102° F. at first, but her temperature

returned to normal as the swelling subsided in ten days. She developed acute otitis media, with enlarged cervical nodes, and the right ear continued to drain for weeks. Her blood counts ranged between 8,400 (polymorphonuclear cells 48 per cent) on admission and 12,000 (polymorphonuclear cells 58 per cent) on discharge three months later.

Fig. 3.—Right arm, Sept. 29, 1930. Osteoporosis of arm bones more marked. Areas of increased density persist.

On her third admission, June 24, 1930, the complaint was swollen ankles and fever for three weeks. At this time she showed marked lymphadenopathy, especially of the cervical and femoral nodes, which were enlarged to three-quarters of an inch. Her heart was enlarged and rapid; the liver and spleen were enlarged. There was swelling of the left ankle with redness over the external malleolus and slight puffiness of the left foot. Diagnosis of Hodgkin's disease or lymphoid leucemia was advanced upon admission.

The latter diagnosis was established by biopsy of a node. During the remaining six months of life the child developed numerous joint manifestations, hemorrhages from the bowel, into the skin, and shortly before exitus, from the gums, nose, and

Fig. 4.—Left arm and leg, Dec. 26, 1930. Marked osteoporosis of arm bones. Cortex shows marked thinning.

ear. Gingivitis and a lip infection also occurred. The liver and spleen were moderately enlarged.

Five transfusions and seven x-ray treatments were given, but the course was steadily downhill.

TABLE I

DATE	6/25/30		7/13	7/30	8/13	9/4		9/16	10/10	11/5	12/4	1/1/31
Hemoglobin Percentage	55			50	38	50		60			45	20
Red cells	2,500,000			3,200,000	2,600,000	2,510,000		390,000	3,000,000	1,900,000	2,180,000	1,000,000
White cells	13,200		14,400	12,000	8,600	4,250		2,900	8,800		12,000	1,100
Polymorphonuclear Leucocytes Percentage	5		20	20	17	24		68	20	25	37	16
Small Lymphocytes Percentage	23		69	18	64			28	79	46	23	28
Large Lymphocytes Percentage	72		9	62	19	76		1		20	5	44
Monocytes Percentage			2					3	1		30	
Other forms Percentage										9	5	12
Platelets								350,000		160,000	Decreased	
											2 Nucleated red cells	

TRANSFUSION

TRANSFUSION

Roentgenograms of the long bones (Figs. 1-4) showed irregular bone atrophy. The blood counts showed marked anemia, which was not benefited by transfusion. The hemoglobin was maintained around 50 per cent with a terminal drop to 20 per cent; the red cells from around 2,500,000 to 3,000,000 were later reduced to 1,000,000. The white cells varied greatly, from 14,000 on admission to 2,100 two months later. The highest count was 19,000, the lowest (terminal), 1,100. Polymorphonuclear cells were decreased at all times, except for one brief rise following a transfusion. Small lymphocytes predominated. Platelets remained normal until shortly before death on January 2, 1931, when they were decreased. Permission for autopsy was refused.

This case is reported to draw attention to the fact that joint symptoms may be a prominent part of the picture of acute leucemia in children and also to emphasize that the absence of evidence of acute carditis in the presence of polyarthritis in a child under three years of age is presumptive evidence that the carditis is not rheumatic in origin.

REFERENCES

1. Cooke, J. V.: J. A. M. A. **101:** 6, 1933.
2. Smith, Carl H.: Am. J. Dis. Child. **45:** 123, 1933.
3. Poynton, F. J., and Lightwood, R.: Lancet **1:** 1192, 1932.
4. Lucas, W. P., and Washburn, A. H.: Clinical Pediatries **21:** pp. 379-383, New York, 1930, D. Appleton & Co.

BELLEVUE HOSPITAL

THE EARLY SIGNS OF VITAMIN A DEFICIENCY IN ALBINO RATS

FU-TANG CHU, M.D., AND ANNA MURPHY
BOSTON, MASS.

XEROSIS, xerophthalmia, keratoconjunctivitis, or keratomalacia are the terms which have been used for the past two decades to designate the various stages of the eye condition which have been recognized as characteristic of vitamin A deficiency in man and in animals. Osborne and Mendel[1, 2] were the first to call attention to the fact that when young rats were fed mixtures of purified foodstuffs they failed to grow normally and that a "type of nutritive deficiency, exemplified in the form of an infectious eye disease, prevalent in the animals inappropriately fed, is speedily alleviated by the introduction of butter fat into the experimental ration." Since then, other investigators[3, 4] have recorded the occurrence of eye trouble in a large proportion of rats on diets deficient in vitamin A. In man, while the early record of observations on ophthalmia in relation to diet may be dated as far back as 1884,[5] considerable interest in this deficiency disease has been a development of rather recent years. Since Bloch[6-11] published a series of clinical observations on his patients with malnutrition, xerophthalmia, and night blindness, reports of a similar nature have appeared from various parts of the world. The disease may occur in adults[12] as well as in children, but it is in young infants that the malady runs a malignant course, not infrequently leading to permanent blindness and even death. Such tragic outcomes could be avoided if we were able to recognize vitamin A deficiency early in its course, even before the eye symptoms, the usual criteria for diagnosis, make their appearance. The need for early diagnosis in this condition has been emphasized in a recent article by Blackfan and Wolbach.[13]

The following experiments were undertaken with rats in an attempt to pick out the most common early signs of vitamin A deficiency and to correlate the sequence of events in their development.

METHODS OF STUDY

In this group of rats there were forty-nine females and nine males. The females were kept in groups of five in a cage, and the males in groups of three in three special cages designed for the collection of urine specimens. The rats were from three simultaneous litters. When they were from thirty-five to forty

From the Infants' and Children's Hospitals, and the Department of Pediatrics, Harvard Medical School, Boston, Massachusetts.

days old and weighed from 42 to 63 gm., they were placed on a basal synthetic diet low in vitamin A. Fifteen of the females were given diet No. 1, and the rest diet No. 2. The diet No. 2 was used mainly because there was at hand a vitamin B concentrate to be tried out.

DIET NO. 1	PERCENTAGE
Casein (Harris)	18.0
Salt Mixture (Osborne and Mendel[19])	4.0
Yeast (Mead's Powdered Brewers Yeast)	7.5
Viosterol 250D	0.5
Cornstarch	70.0

DIET NO. 2	PERCENTAGE
Casein (Harris)	18.0
Salt Mixture (Osborne and Mendel[19])	4.0
Vitamin B. Concentrate (Mead)	4.0
Viosterol 250D	0.5
Cornstarch	73.5

According to Baumann and Steenbock,[14] rats which were placed, at the age of four weeks, upon a basal diet failed to mature sexually before they succumbed to other symptoms. Therefore, our rats were started on the basal diet at an older age than is usually the case, for in this way it was expected that most of the females would become sexually mature and would therefore be available for examination of vaginal epithelium during the course of the experiment.

In this series of animals, the appearance of four principal signs of vitamin A deficiency were studied particularly. They were:

1. Cessation of growth.
2. Persistence of cornified epithelial cells in vaginal smears.
3. Increase of epithelial cells in urine.
4. Appearance of early eye signs, the narrowing of the palpebral fissures and swelling of the lids.

Cessation of growth and eye signs were recorded every eight days in the early part of the experiment, and every two days as the expected time of depletion of the body storage of vitamin A approached. In the occasional instance when the white rat had reached a stationary weight for a few days, if followed by a short period of gain, the latter date was taken as the time indicating the presence of the disease.

Vaginal smears were made from all female rats once every four days in the early part of the experiment and later every two days. By means of a capillary pipette containing one or two drops of saline, a small amount of vaginal washing was obtained and allowed to dry on a glass slide. The smear thus obtained was fixed by a flame and stained by Gram's method, without the use of another stain after the decolorization by acid alcohol. Whenever a smear showed a predominating picture of cornified cells, the rat was studied daily until it was proved that this finding was not a part of the estrous cycle in which keratinized epithelial cells normally occur but that it represented histologic changes dependent on the deficiency of the vitamin. The time set for recording a positive "low A smear" was three days after the onset of the histologic change as determined by keratinized cells appearing on four consecutive days.

Urine.—Forty-eight-hour specimens of urine were collected from the male rats, preserved by a small amount of toluene and the total volume measured. Each speci-

men was vigorously shaken for about three minutes and a count was made of the epithelial cells per cubic millimeter. The totals of the epithelial cells in eighteen of the large squares in a standard counting chamber were added, and this number divided by eighteen and multiplied by ten gave the total number of cells per cubic millimeter. In order to facilitate the distinction between the epithelial cells and the few food particles present in the urine, a fresh solution of methyl violet mixture* was drawn into the white count pipette up to the 0.5 mark and the urine was taken in up to the 11 mark. This procedure stained the cellular elements in the urine but left the food particles colorless. Having determined the number of epithelial cells per cubic millimeter and the total volume of urine, the number of epithelial cells per rat per day was calculated. Cell count, rather than simple microscopic examination of the urinary sediment, was made because a few epithelial cells are present in the urine of normal rats and any diagnosis of the deficiency based on urinary findings must lie in an appreciable increase in the number of epithelial cells in the urine of rats as compared with the number in normal urine.

RESULTS AND COMMENTS

1. *Growth-ophthalmia-vaginal smear correlation.*—In all of the female rats the vaginal orifice made its appearance some time before any deficiency was apparent. About 60 per cent of these rats were found to be sexually mature at fifty days and 100 per cent sexually mature at seventy days. Therefore it was possible to use all of the female rats for the growth-ophthalmia-vaginal smear correlations. When the vaginal smear became positive (low A smear) in a given animal, it remained so persistently, with only an occasional deviation from a clear-cut picture of 100 per cent cornified cells to one with an intermingling of a few small nucleated cells, leucocytes, and débris.

The development of "low A smear," early ophthalmia and cessation of growth was completed in this group of rats within a time range of thirty-nine days, in from twenty-five to sixty-four days from the time they were fed the A-deficient ration only. Table I is designed

TABLE I

SEQUENCE OF THE APPEARANCE OF THE THREE EARLY SIGNS OF VITAMIN A DEFICIENCY IN FORTY-NINE FEMALE RATS

SIGN	SEQUENCE OF APPEARANCE	NO. OF RATS	PER CENT
Cessation of growth	as first sign	24	49 ± 7.1
	as second sign	21	43 ± 7.1
	as third sign	4	8 ± 3.7
Early ophthalmia	as first sign	12	24 ± 6.1
	as second sign	24	49 ± 7.1
	as third sign	13	27 ± 6.3
Low A vaginal smear	as first sign	32	65 ± 6.8
	as second sign	12	25 ± 6.2
	as third sign	5	10 ± 4.3

*The mixture consisted of 1 part of Solution No. 1 and 9 parts of Solution No. 2 filtered before use.

Solution No. 1: absolute alcohol 33 c.c., aniline 9 c.c., and methyl violet in excess.

Solution No. 2: saturated aqueous solution of methyl violet.

to show the sequence of the appearance of these three common signs of vitamin A deficiency in the individual rats. A "low A smear" was predominantly an early sign of deficiency, 65 ± 6.8 per cent of the individual animals exhibiting this sign simultaneous to, or before, either of the others. Cessation of growth developed also early. Since the difference between 65 ± 6.8 and 49 ± 7.1 is not statistically significant, it is not justified to conclude with this small group of rats that cessation of growth is a later sign than the "low A smear." Eye signs were observed relatively late, being the first sign in only about one quarter of the animals.

When the appearance of a "low A smear" is compared to that of cessation of growth in all the rats examined, they are found to run very close to each other. In a few individuals, however, the vaginal epithelium became abnormal as long as two to three weeks before the cessation of growth. The following figures will bring out these points:

Low A smear simultaneous to cessation of growth		33.0 ± 6.7%
Low A smear 3 to 7 days earlier than cessation of growth	24.5%	40.5 ± 7.0%
Low A smear 8 to 21 days earlier than cessation of growth	16.0%	
Low A smear 3 to 9 days later than cessation of growth		26.5 ± 6.2%

The data given above confirm the findings of Evans and Bishop[15] and of Baumann and Steenbock[14] that vaginal epithelial changes can occur before the disturbance of growth in rats with vitamin A deficiency. This change of epithelial structure, detectable during life and preceding or simultaneous to the cessation of growth in two-thirds of the rats examined, is worthy of consideration from the diagnostic point of view.

2. *Epithelial cells in urine.*—As is shown in Table II, the count of the epithelial cells in urine varied from time to time within quite a wide range. On the whole, however, there was an appreciable increase of cells in the early part of the deficiency period. It is inter-

TABLE II

NUMBER OF URINARY EPITHELIAL CELLS* PER RAT PER DAY IN MALE RATS WITH VITAMIN DEFICIENCY

CAGE	RAT NO.	TIME OF CESSATION OF GROWTH AND EARLY OPHTHALMIA	DEC. 13 TO 14	DEC. 21 TO 22	DEC. 25 TO 26	DEC. 29 TO 30	DEC. 31 TO JAN. 1	JAN. 5 TO 6	JAN. 7 TO 8	JAN. 13 TO 14
2	104 105 106†	January 2-8	14.9	19.3	15.4	22.1	27.8	22.0	18.5	30.2
3	107 108 109†	January 2-8	20.4	23.4	21.7	33.2	33.3	22.3	29.4	41.0
4	Normal rats	---------	---	14.0	14.5	12.5	17.6	15.6	---	13.5

*The numbers of epithelial cells are expressed in thousands.
†Removed from the cage on December 31 on account of lack of space.

esting to note that the increase of urinary epithelial cells was observed a few days before the time of cessation of growth and the appearance of the eye signs. The data may suggest the possibility of early recognition of vitamin A deficiency by means of urinary examinations, although only a small group of rats was observed in this study.

To corroborate the finding of increased number of epithelial cells in forty-eight-hour specimens of urine during the deficiency period, and in an attempt to avoid the possible contamination of urine by epithelial cells from skin, a supplementary experiment was undertaken, in which a few drops of fresh urine were collected directly from rats in the deficiency stage and from a number of rats from the same group after they were again normal following an intensive treatment for about two weeks with vitamin A-containing food. In collecting the urine, a test tube was placed about 1 cm. beneath the urethral orifice while the rat was made to inhale ether. Precaution was taken not to contaminate the mouth of the test tube by the epithelial cells of the skin, and those of the vagina in case of a female rat. Three specimens were collected from each rat, and the highest count obtained was recorded. The result of this study was presented in Table III. A count

TABLE III

NUMBER OF URINARY EPITHELIAL CELLS PER CUBIC MILLIMETER OF FRESH URINE SPECIMENS

	NO. OF RATS EXAMINED	PERCENTAGE OF RATS WITH LESS THAN 30 CELLS PER CU. MM. (NEGATIVE)	PERCENTAGE OF RATS WITH MORE THAN 30 CELLS PER CU. MM. (POSITIVE)
Rats in advanced stage of deficiency	29	17 ± 7.0	83 ± 7.0
Rats in convalescence from deficiency	16	78 ± 7.7	12 ± 7.7
Control rats (normal)	27	100	0

of 30 cells per cubic millimeter was arbitrarily chosen as the demarcation line between the urine of a normal rat and that during the stage of vitamin A deficiency. The presence of high counts in the majority of deficiency rats and the relatively low counts in the same rats after convalescence definitely established the validity of using the increased epithelial cells in urine as a sign of vitamin A deficiency. But it must be noted that in the three examinations done for each rat at the deficiency period, low counts were met in the first two examinations in several instances. So the urinary examinations must be repeated in order to make this test of diagnostic value.

Wolbach and Howe[16] first demonstrated that the characteristic keratinization of epithelial structures was present in the urinary tract as

well as in the other organs. Tyson and Smith[17] stated that in vitamin A deficiency the epithelium of the renal pelvis might be involved quite early and that in the renal pelvis the hyperplasia overshadowed the keratinizing process. According to the recent work of Thatcher and Sure,[18] the typical histologic change was found in the urinary passage in a large proportion of rats during the early part of deficiency. The result of this study tends to show that not only is the pathology present in the urinary tract but also that it is detectable by examinations of urine during life.

3. *Kidney Function in Vitamin A Deficiency.*—While collecting the urine for cell counts, it was considered worth while to ascertain whether there could be any impairment of kidney function during the course of deficiency. This was done by following the concentration of the urine and also the excretion of creatinine in specimens collected at various

TABLE IV

THE CONCENTRATION OF URINE AND EXCRETION OF CREATININE IN THE COURSE OF VITAMIN A DEFICIENCY

DATE	POOLED URINE FROM 3 CAGES		URINE FROM CAGE 1		URINE FROM CAGE 2		URINE FROM CAGE 3	
	CONCENTRATION	CREATININE* MG.	CONCENTRATION	CREATININE* MG.	CONCENTRATION	CREATININE* MG.	CONCENTRATION	CREATININE* MG.
Dec. 1- 8	2.26M	--	----	--	----	--	----	--
Dec. 9-20	2.20	--	----	--	----	--	----	--
Dec. 21-24	2.05	45	----	--	----	--	----	--
Dec. 25-28	2.48	36	----	--	----	--	----	--
Jan. 5- 6	----	--	2.59M	40	----	30	1.47M	48
Jan. 7- 8	----	--	2.40	33	2.02M	42	1.41	43
Jan. 9-10‡	----	--	3.00	31	2.94	35	1.72	49
Jan. 11-14	----	--	----	35	----	31	1.66	48
Jan. 19-22	----	--	----	28	----	32	----	35
Jan. 23-26	----	--	----	30	----	27	----	*
Jan. 29–Feb. 1	----	--	----	†38	----	34	----	34
Feb. 9-15	----	--	----	†	----	36	----	*

*Mg. of creatinine in urine per twenty-four hours per kilo of body weight.
†Death of one rat.
‡Clinical signs of deficiency were visible in all rats since January 8.

stages of the disease. As shown in Table IV, there was no definite and constant change either in the concentration of urine as determined by the freezing point method or in the amount of creatinine excreted per twenty-four hours per kilo of body weight. The results seem to indicate that it would be futile to study the kidney function as a means of making or confirming the diagnosis of vitamin A deficiency.

SUMMARY

1. In a group of experimental animals, it is shown that by examination of secretions of the genitourinary tract, vitamin A deficiency may be recognized in a considerable number of instances early in its

course. Diagnosis on this basis may at times be made before the cessation of growth and the appearance of ophthalmia, which are the usual criteria of diagnosis in rats.

2. The vaginal smear method may not be applicable to children, but it does prove the fact that an examination of secretions is a logical approach to diagnosis. Examinations of urine for an increase in the epithelial cells may be a valuable aid in the early recognition of the disease. Examinations should be repeated several times in order to give this test the most diagnostic value.

3. As judged by the freezing point of urine and the excretion of creatinine, there is no impairment of kidney function in the course of vitamin A deficiency.

The writer wishes to express his thanks to Dr. K. D. Blackfan, Dr. J. L. Gamble, and Dr. C. F. McKhann for their constant interest and advice throughout this study and for their kindness in furnishing laboratory facilities. Grateful acknowledgment is also due to Mead Johnson and Company for the provision of vitamin B concentrate.

REFERENCES

1. Osborne, T. B., and Mendel, L. B.: J. Biol. Chem. **15:** 311, 1913.
2. Idem: Ibid. **16:** 423, 1913.
3. Emmett, A. D.: Science **52:** 157, 1920.
4. Osborne, T. B., and Mendel, L. B.: J. A. M. A. **76:** 905, 1921.
5. Kuschbert: Deutsche med. Wchnschr. **10:** 326, 1884.
6. Bloch, C. E.: J. A. M. A. **68:** 1516, 1917.
7. Idem: J. Hygiene **19:** 283, 1921.
8. Idem: Am. J. Dis. Child. **27:** 139, 1924.
9. Idem: Am. J. Dis. Child. **28:** 659, 1924.
10. Idem: Am. J. Dis. Child. **31:** 315, 1926.
11. Idem: Am. J. Dis. Child. **42:** 263, 1931.
12. Pillat, A.: National Med. J. China **15:** 614, 1929.
13. Blackfan, K. D., and Wolbach, S. B.: J. Pediat. **3:** 678, 1933.
14. Baumann, C. A., and Steenbock, H.: Science **76:** 417, 1932.
15. Evans, H. M., and Bishop, K. S.: J. Metabolic Research **1:** 319 and 335, 1922.
16. Wolbach, S. B., and Howe, P. R.: Proc. Soc. Exper. Biol. and Med. **22:** 402, 1925.
17. Tyson, M. D., and Smith, A. H.: Am. J. Pathology **5:** 57, 1929.
18. Thatcher, H. S., and Sure, B.: Arch. Pathology **13:** 756, 1932.
19. Osborne, T. B., and Mendel, L. B.: J. Biol. Chem. **37:** 557, 1919.

PARENTERAL USE OF CAROTENE IN THE TREATMENT OF VITAMIN A DEFICIENCY IN ALBINO RATS

FU-TANG CHU, M.D., AND HARRIET COADY
BOSTON, MASS.

ALTHOUGH it has been well known that keratomalacia is due to deficiency of vitamin A in the diet, the oral treatment of the eye condition with substances showing vitamin A potency has not proved to be uniformly effective. Among the factors which may interfere with the efficacy of vitamin A when administered orally may be mentioned diarrheal diseases, diseases of liver, gallbladder and pancreas, occlusion of the bile ducts, and other disorders which result in a faulty metabolism of fat. Both Hsu[1] and Weech[2] mentioned the association of keratomalacia with diarrhea and dysentery. Bloch[3] reported a case of xerophthalmia in which periodic attacks of diarrhea were accompanied by aggravation of the eye symptoms. Wagner[4] discussed the relation of liver function and xerophthalmia in a series of cases. In a clinical pathologic report, Higgins and Mallory[5] presented the case of an infant in which keratomalacia was associated with fat intolerance and chronic pancreatitis. Particularly in patients with biliary occlusion, evidence has been brought forward by Parsons[7] to show that a very small amount of the ingested fat is absorbed; that is, only about 30 per cent of the fat intake, as compared to 98 per cent in the normal, is utilized in these subjects. In a recent article by Blackfan and Wolbach[6] it has been pointed out that histologic changes characteristic of vitamin A deficiency were found in a number of infants, in whom congenital obliteration of the bile ducts, extensive sclerosis of the pancreas, or acute generalized infection were prominent features. From experimental evidence, Rowntree[8] concluded that the loss of vitamin A runs parallel to the elimination of fat through excretion by the bowels. From these clinical data and experimental evidence, it can be deduced that any mechanism which interferes with the normal absorption of fat, whether mechanically or functionally, may hinder the proper utilization of vitamin A when given by mouth.

The oral use of cod liver oil during the advanced stage of keratomalacia has been discouraging. In the experience of the writer, large doses, as much as 15 c.c. given three times a day, have failed to check the progress of the destructive eye lesions. In view of the failure of oral methods of treatment, administration by the parenteral route is naturally suggested.

From the Infants' and Children's Hospitals and the Department of Pediatrics, Harvard Medical School, Boston, Massachusetts.

Recently the efficacy of carotene by mouth in the treatment of vitamin A deficiency has become widely recognized. As far as we are aware, however, no mention has been made in the literature of its parenteral use in this disease. The following experiments were undertaken in an attempt to test out this method of therapy in rats with vitamin A deficiency, with and without the accompaniment of diarrhea.

PROCEDURE

A group of female albino rats were placed on a basal synthetic diet low in vitamin A at the age of from thirty-five to forty days, at 42 to 61 gm. of weight. The composition of the diet was as follows:

	PERCENTAGE
Casein, purified (Harris)	18.0
Salt mixture (Osborne and Mendel[15])	4.0
Vitamin B concentrate*	4.0
Viosterol 250D	0.5
Cornstarch	73.5

Basal ration and distilled water were supplied in liberal amounts at all times. Separate cages with elevated wire bottoms were used for the individual animals as soon as they were ready for treatment. In each experiment, rats of nearly corresponding weight and those which came to the condition of depletion at about the same time were chosen in comparing the effects of the different types of treatment. Weekly records of weight and eye condition, together with other observations, were made throughout the experiments.

In the experiments the rat was considered to be in a state of depletion when it had shown all of the three early signs of deficiency; namely, cessation of growth, the persistence of cornified epithelial cells in vaginal smears, and ophthalmia. Treatment was sometimes begun soon after this state of depletion was observed, and sometimes considerably later, depending on whether we wished to observe the therapeutic effects of the treatment in the early or late stages of the disease.

Two brands of carotene preparations were used for the treatment. Carotene No. 1 contained a strength of vitamin A about ten times that of cod liver oil, while No. 2 was a 0.3 per cent solution of pure carotene.

The technic for the injection of carotene was as follows: Standard tuberculin syringes and hypodermic needles, 24 gauge, ⅝ inch long, were used. The rats were firmly held by an assistant, one hind leg being held in an extended position for the injection. The hair was clipped as closely as possible from the posterior portion of the thigh, and the clipped area was washed with alcohol and allowed to dry. It was found that when the injections were made subcutaneously or

*Acknowledgment is due Mead Johnson & Co. for the provision of vitamin B concentrate and a part of the carotene preparations used in the experiments.

straight down into the muscle tissue, a large proportion of the material injected leaked out through the site of the puncture. In order to eliminate this loss, the needle was passed through the skin while being held parallel to the skin surface and then sharply turned inward so as to make the injection into the muscle substance. The needle was withdrawn quickly and the site of the puncture was pressed with a small piece of cotton and massaged with a little pressure for a few minutes. Leakage rarely occurred with this technic, but when it did occur the contamination of carotene on the skin was washed away with ether until the yellow color was no longer visible. A small drop of collodion was finally applied at the site of the puncture to insure against subsequent oozing. The two thighs were used alternately for the injections.

In the case of oral administration, the technic consisted simply of giving carotene directly into the mouth in small drops from the same type of syringe and needle as used for the injections.

EXPERIMENT I

PARENTERAL TREATMENT IN THE EARLY STAGES OF THE VITAMIN A DEFICIENCY

Treatment was started from two to six days after the development of all three of the deficiency signs mentioned above, when the animals had been on the basal diet for a period of from forty-six to fifty-seven days. Carotene No. 1 was used for one group of rats, and Carotene No. 2 for the other. The effects of the intramuscular injections of these preparations were compared to those of oral treatment. Each rat received eleven treatments, Group 2 being given daily treatment and Group 1 being treated every other day. The period of observation lasted for four weeks for Group 1 and three weeks for Group 2. As far as possible all the environmental factors were kept the same for all rats in each group with the exception of the fact that those which received the injections were liable to suffer from the local trauma and swelling caused by the injection, from which the other animals were free.

In Tables I and II, it is clearly shown that gains in weight and improvement of the eye symptoms followed both forms of treatment. However, the resumption of growth commenced earlier and proceeded more rapidly in the animals being given carotene by mouth than in those receiving the intramuscular injections.

It may be mentioned here that in the course of the treatment, little or no evidence of infection at the site of the injections was observed, in spite of the fact that no particular effort was made to sterilize the

TABLE I

PARENTERAL TREATMENT IN THE EARLY STAGE WITH CAROTENE SOLUTION NO. 1 (GROUP 1)

RAT NO.	TYPE OF TREATMENT	DOSAGE (Q. 2D) C.C.	WEIGHT IN GM. AT BEGINNING OF TREATMENT	TOTAL WEIGHT GAIN IN GM.	AVERAGE WEEKLY GAIN IN GM.	RESUMPTION OF GROWTH*	EYES AT END OF EXPERIMENT
45	Injection	0.1	144	15	3.8	17	Normal
43	Injection	0.1-0.2†	129	22	5.5	17	Normal
44	Injection	0.2	132	27	6.8	14	Normal
22	Oral	0.1	140	23	5.8	4	Normal
50	Oral	0.1	126	32	8.0	2	Normal
24	Oral	0.2	157	28	7.0	2	Normal
109	Negative control	--	145	-23	-5.8	--	Marked xerophthalmia
106	Negative control	--	133	---	---	--	Died in 18 days

*Days after the first treatment, when the gain in weight commenced.
†First 4 doses of 0.1 c.c. followed by 7 doses of 0.2 c.c. each.

TABLE II

PARENTERAL TREATMENT IN THE EARLY STAGE WITH CAROTENE SOLUTION NO. 2 (GROUP 2)

RAT NO.	TYPE OF TREATMENT	DOSAGE (DAILY) C.C.	WEIGHT IN GM. AT BEGINNING OF TREATMENT	TOTAL WEIGHT GAIN IN GM.	AVERAGE WEEKLY GAIN IN GM.	RESUMPTION OF GROWTH*	EYES AT END OF EXPERIMENT
33	Injection	0.2	144	23	7.7	10	Normal
47	Injection	0.2	143	25	8.3	10	Normal
49	Oral	0.2	130	15	5.0	5	Normal
25	Oral	0.2	144	28	9.3	7	Normal
104	Negative control	--	156	-14	-4.8	--	Marked xerophthalmia
107	Negative control	--	172	-30	-10	--	Marked xerophthalmia (Died on 22nd day of experiment)

*Days after the first treatment, when the gain in weight commenced.

carotene preparations injected. In a number of cases, however, swellings in the muscles could be felt for a number of days after the injection. This tendency of the carotene solution to collect at the place of injection and its slow absorption apparently explain the delayed response of this group of animals to the parenteral administration of carotene.

EXPERIMENT II

PARENTERAL TREATMENT IN THE ADVANCED STAGES OF VITAMIN A DEFICIENCY

It was possible to study the effect of parenteral treatment in the late stages of the disease because of the fact that this group of rats was started on the basal diet at an older age than is usually done and was therefore able to survive longer. That the disease was well advanced at the time of treatment is indicated by the long time during which these rats had been in a state of depletion.

These animals had shown cessation of growth for from ten to thirty-seven days and the eye symptoms for from sixteen to thirty-one days before the treatments were begun. The experiment lasted for two and a half weeks after the first treatment. As shown in Table III, the results of treatment in this group were essentially similar to those of the preceding experiment. It may be of interest to note that the resumption of growth started no later than in the group of animals which were treated at an earlier stage of the disease. This is equally true of animals which were given oral administrations or intramuscular injections of carotene.

TABLE III

PARENTERAL TREATMENT IN THE ADVANCED STAGE WITH CAROTENE NO. 2

RAT NO.	DAYS OF CESSATION OF GROWTH BEFORE TREATMENT	DAYS OF XEROPHTHALMIA BEFORE TREATMENT	TYPE OF TREATMENT*	WEIGHT IN GM. AT BEGINNING OF TREATMENT	TOTAL WEIGHT GAIN IN GM.	AVERAGE WEEKLY GAIN IN GM.	RESUMPTION OF GROWTH†	EYES AT END OF EXPERIMENT
51	28	28	Injection	116	11	4.4	8	Slight xerophthalmia
53	30	30	Injection	101	20	8.0	8	Normal
11	20	21	Injection	149	23	9.2	10	Normal
46	16	16	Injection	133	11	4.4	10	Normal
6	24	20	Oral	140	24	9.6	Less than 7	Normal
13	37	24	Oral	144	22	8.8	Less than 7	Normal
9	14	31	Negative control	120	−14	− 5.6	----------	Marked xerophthalmia
10	10	25		120	−36	−14.4	----------	Marked xerophthalmia

*Eight doses of 0.2 c.c. each daily were given in the first eight days of the experiment which lasted for two and one-half weeks.

†Days after the first treatment, when the gain in weight commenced.

EXPERIMENT III

THE INFLUENCE OF DIARRHEA ON THE PARENTERAL TREATMENT OF VITAMIN A DEFICIENCY

A comparison of the effects of oral and parenteral treatments was made in another group of rats with vitamin A deficiency, in which a state of defective absorption in the gastrointestinal tract was artificially induced by the administration of 0.5 c.c. of liquid paraffin orally twice a day to each rat. The administration of the mineral oil was started one day before the beginning of the carotene treatment, and in case of rats receiving carotene orally, one dose of the oil was given immediately following the feeding of carotene. It was definitely observed during the course of the experiment that the rats which received both liquid paraffin and carotene by mouth passed stools of a very oily consistency and intense yellow color, indicating that a large amount of the carotene was actually carried through the bowels without being absorbed. The daily dose of 1 c.c. of paraffin was chosen because it was thought that a dose slightly larger than the largest used harmlessly by Rowntree[9] should be suitable for our purpose.

Carotene treatment was started from one to two days after the development of all three of the deficiency signs mentioned above, and the whole experiment covered a period of four weeks after the first treatment. As shown in Table IV, the presence of diarrhea caused a marked reduction in the gain in weight when the carotene was given by mouth but did not make any appreciable difference when the treatment was parenteral. That 1 c.c. of mineral oil daily was not deleterious in itself is shown by the fact that rats Nos. 51 and 53 were able to hold stationary weights for seventeen days after the first dose of oil and that their loss of weight during the entire experiment was not excessive. It is probable that if more interference with the absorption of carotene could be produced experimentally, a more favorable response to the parenteral treatment might have followed.

DISCUSSION

The relation of carotene to vitamin A has been a topic of controversy for more than a decade. Recently there has appeared experimental evidence in favor of the assumption that carotene is a precursor of vitamin A. Moore[10] showed that carotene in plant material is convertible into vitamin A in the animal body. Olcott and McCann[11] further demonstrated that carotene could be changed to vitamin A in vitro by incubation with fresh liver tissue or with an aqueous extract of liver; the livers of rats which were raised on a vitamin A free diet were used in preparation of the extract. Regardless of the exact relation of carotene to vitamin A, the fact that carotene is a substance having

TABLE IV

THE INFLUENCE OF DIARRHEA ON THE EFFECTS OF ORAL AND PARENTERAL TREATMENTS

	RAT NO.	TYPE OF TREATMENT (13 DOSES*)	WEIGHT IN GM. AT BEGINNING OF TREATMENT	TOTAL WEIGHT GAIN IN GM.	AVERAGE WEEKLY GAIN IN GM.	EYES AT END OF EXPERIMENT
A	23	Carotene orally	134	18	4.5	Normal
	27		111	30	7.5	Slight xerophthalmia
	54		119	29	7.3	Normal
B	29	Carotene orally+ Liquid paraffin	140	7	1.8	Normal
	32		116	12	3.0	Slight xerophthalmia
C	36	Carotene parenterally	140	12	3.0	Normal
	38		130	10	2.5	Normal
D	48	Carotene parenterally + Liquid paraffin	126	10	2.5	Normal
	52		137	15	3.8	Normal
E	51	Liquid paraffin only	125	−9	−2.3	Marked xerophthalmia
	53		113	−12	−3.0	Marked xerophthalmia
F	42	Negative control	121	−7	−1.8	Xerophthalmia

*Two doses of 0.03 c.c., three doses of 0.05 c.c., and then eight doses of 0.2 c.c. each, all given at the intervals of every other day.

vitamin A activities is undisputed. It was therefore used to represent vitamin A in these experiments.

In this study the effectiveness of carotene when given by mouth is well confirmed. In addition it is shown that following intramuscular injections, the substance can be absorbed and utilized by the body, although less readily than when given orally. This may imply that the conversion of carotene to vitamin A in vivo is not necessarily through the medium of the digestive system.

In a study of the absorption of fat given parenterally, Koehne and Mendel[12] injected butter fat and cod liver oil subcutaneously and intraperitoneally into a group of rats with vitamin A deficiency and reported fairly favorable results. In our rats the improvement following the parenteral treatment was considerably more marked than that observed by these workers, probably because of the use of a more active substance. Besides the simple factor of containing more substance with vitamin A activity, the concentrated form of carotene which we used may be of additional advantage in that being bound up in a small amount of lipoid solvent, the active substance is more readily dispersed and utilized. Jorstad's observations[13] suggest that lipoid solvents when introduced subcutaneously tend to remove vitamin A from the surrounding tissue. It may be further deduced that the less the amount of solvent used, the better will be the chance of the injected vitamin's being utilized by the body.

The usefulness of parenteral treatment as compared to oral treatment is best brought out by Experiment III, in which the artificial

interference with normal absorption of fat is produced to exemplify pathologic conditions which may be met with in human cases and which result in a disturbance of the fat metabolism of the body. In the literature, only a few records of patients' receiving parenteral treatment with cod liver oil concentrates have been reviewed.[3, 14] Although the data in this study are not extensive, the results are so uniform that they seem to supply experimental evidence for the value of such treatment. As is suggested in these experiments, the indication for the parenteral treatment would be cases of (a) protracted keratomalacia in association with chronic diarrhea, (b) vitamin A deficiency due to congenital defects such as the type of biliary occlusion which is amenable to surgery, (c) vitamin A deficiency in association with temporary disturbance of the fat metabolism due to infections and other causes, and (d) advanced keratomalacia in which permanent blindness is frequently a threatening complication and where parenteral treatment should be given to supplement the oral therapy.

CONCLUSIONS

1. Carotene given intramuscularly is effective in curing vitamin A deficiency in rats, both in the early and late stages of the disease.

2. When the subject's condition is entirely due to the lack of vitamin-A-containing substances in the diet and is not complicated by any other factor, the response to carotene injection is slower and less marked than the response to the oral administration of carotene.

3. In the presence of a disturbance which may result in a defective absorption of fat, intramuscular injection of carotene is of distinct therapeutic value as an adjunct to the oral treatment.

I wish to express grateful appreciation to Dr. Kenneth D. Blackfan, Dr. James L. Gamble, and to Dr. Charles F. McKhann for their constant interest and assistance in making this study possible. Acknowledgment is due Mead Johnson & Co. for the provision of vitamin B concentrate and a part of the carotene preparations used in the experiments.

REFERENCES

1. Hsu, K. L.: China M. J. **41**: 825, 1927.
2. Weech, A. A.: Am. J. Dis. Child. **39**: 1153, 1930.
3. Bloch, C. E.: Am. J. Dis. Child. **31**: 315, 1930.
4. Wagner, R.: Wien. med. Wchnschr. **74**: 2607, 1924.
5. Higgins, H. L., and Mallory, T. B.: New England J. Med. **204**: 1264, 1931.
6. Blackfan, K. D., and Wolbach, S. B.: J. PEDIAT. **3**: 678, 1933.
7. Parsons, L. G.: Am. J. Dis. Child. **43**: 1293, 1932.
8. Rowntree, J. I.: J. Nutrition **3**: 265, 1930.
9. Rowntree, J. I.: J. Nutrition **3**: 345, 1931.
10. Moore, T.: Biochem. J. **24**: 692, 1930.
11. Olcott, H. S., and McCann, D. C.: J. Biol. Chem. **94**: 185, 1931.
12. Koehne, M., and Mendel, L. B.: J. Nutrition **1**: 399, 1929.
13. Jorstad, L. H.: J. Cancer Research **10**: 229, 1926.
14. Blegvad, O.: Ugesk. f. laeger **85**: 127, 1923; quoted in the editorial of Brit. M. J. **1**: 122, 1924.
15. Osborne, T. B., and Mendel, L. B.: J. Biol. Chem. **37**: 557, 1919.

Pediatric Clinics

THE DEPARTMENT OF PEDIATRICS IN THE GRADUATE SCHOOL OF THE UNIVERSITY OF MINNESOTA AT ROCHESTER AND THE SECTION ON PEDIATRICS OF THE MAYO CLINIC

HENRY F. HELMHOLZ, M.D.
ROCHESTER, MINN.

THE title indicates the dual nature of the department of pediatrics, one part is a clinical section in the Mayo Clinic, and the other an integral part of the Graduate School of the University of Minnesota. In order to understand this connection it is necessary to sketch briefly the development of the Mayo Clinic and how in its development it came to interdigitate with the Graduate School of the University of Minnesota, through the Mayo Foundation, which resulted from a gift of Drs. William J. and Charles H. Mayo.

The Mayo Clinic is the outgrowth of a general country practice started in 1863 by Dr. W. W. Mayo in the then village of Rochester, Minn. The pioneer surgeon of southern Minnesota was joined in his practice by his son William James in 1884 and by his son Charles Horace in 1889. The father retired from practice in 1890 at the age of seventy years, and from then until 1904 the two brothers carried on with the help of assistants and internes. In 1905 Dr. E. Starr Judd was added to the staff as junior surgeon, and as the work grew, additional surgical services were added until there were ten general surgical sections in 1920, besides sections on orthopedics and neurosurgery.

The hospital facilities lagged behind considerably, and for many years only surgical patients were hospitalized, and so-called medical patients were sent home for treatment. In 1889, St. Mary's Hospital was opened, with a capacity of forty beds; in 1893 an additional wing increased the capacity to seventy-five, and in 1897, 1904, 1908, and 1912 additional wings increased the capacity to 300 beds. In 1922 a larger addition brought the capacity to 600 beds. In 1918 an isolation hospital with a capacity of twenty-three beds was opened in conjunction with St. Mary's Hospital.

The need for further beds in 1906, necessitated the opening of the Kahler Hospital in May, 1907, with a capacity of sixty beds.

In 1915, the Colonial Hospital was opened, with a capacity of 244 beds; the Worrall Hospital, with 140 beds in 1919; the Curie Hospital, in 1920 with thirty beds; and in 1921 the new Kahler Hospital with a capacity of 210, giving accommodations for, roughly, 1,000 patients.

As will be noted, the great increase in capacity of the hospitals came in 1921 and 1922. It was during this period that, for the first time, hospitalization of medical patients was started on a large scale.

General medicine and medical specialties at the Mayo Clinic have developed in three stages: (1) as part of a general hospital practice in which general diagnosis and medical and surgical treatment were all of fairly equal interest; (2) a period during which a great surgical clinic developed, general diagnosis and surgical treatment greatly increased in importance, and it became less possible to treat patients in

hospitals medically; and (3) a period in which, without reduction in volume of, or interest in, general diagnosis and surgical treatment, there gradually grew up a large activity in the treatment of patients in hospital from the standpoints both of general medicine and of medical specialties.

The original clinic building was erected in 1912, and almost with its completion was outgrown, so that the laboratories of biochemistry and pathology were put into an addition that was built on the roof, and the clinical sections overflowed into the Hotel Zumbro, Zumbro Annex, Kahler Hotel, and a remodeled store. It was

Old and New Clinic Buildings

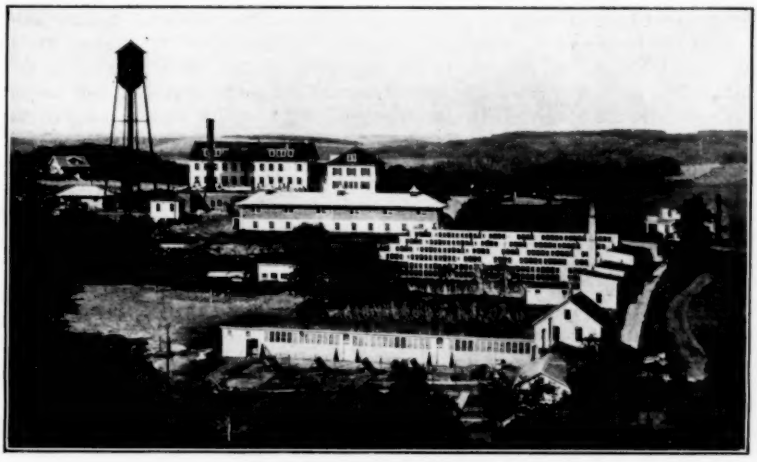
evident that only a new building could bring about efficiency of work and comfort for patients that were now waiting in corridors and small waiting rooms. In 1929 the new clinic was occupied, and the laboratories of the old building were returned to their original functions.

By 1919, the tremendous increase in number of patients taxed to the utmost the diagnostic facilities of the clinic, and it was at this time that the necessity of a special section on pediatrics was evident.

The clinic functions as a large diagnostic institute through which all patients must pass. There is no surgical section on the clinic floor. All patients enter the

clinic as medical patients; the surgeon acts only in the capacity of consultant. The attitude toward surgery is expressed by W. J. Mayo when he says that surgery is merely a form of treatment. The patients go to the various laboratories to get their examinations and then return to the original examiner. Patients too sick to move about are sent directly to the hospital for examination.

The diagnosis and treatment of diseases of children in the clinic was first in charge of Dr. Archibald on Dr. Giffin's service, and later on Dr. Archibald's service entirely separate from Dr. Giffin's. Dr. Archibald left the clinic June 17, 1917, for military service, and July 1, 1917, Dr. Rood Taylor was placed in charge of the section on pediatrics. Dr. Taylor resigned in February, 1919, to become assistant professor of pediatrics in the Medical School of the University of Minnesota. Dr. Archibald returned to the clinic, September 8, 1919, and had charge of the section until September, 1920, when he resigned and went to Scotland. January 1, 1921, Dr. Henry F. Helmholz took charge of this section with Dr. Samuel Amberg as his associate.



Institute of Experimental Medicine

The Mayo Clinic must be thought of as carrying on a large private practice and so, in like manner, the section on pediatrics as a large private pediatric practice, consisting largely of the pediatric work of the county immediately surrounding Rochester and of interesting patients brought from distances, usually on the recommendation of a former patient or on the recommendation of a physician at the patient's home. The two types of work complement one another. The referred patient is likely to present an unusual condition and to encounter only such patients would give the postgraduate student (the Fellows of the Mayo Foundation) the idea that practice is a succession of cases of leucemia, Hodgkin's disease, trauma of the brain, birth palsy, and the like, were it not for the local work from which he gets a fairly good idea of the nature of general pediatric practice.

Children are hospitalized at St. Mary's Hospital. Twenty-five beds for them are in the south wing of the hospital, and additional single rooms are available on the same floor. Certain special groups of patients are hospitalized in the Worrall Hospital or Colonial Hospital, such as those cared for by physicians in the sections on ophthalmology, otolaryngology, and dermatology. All children who are less than fifteen years of age are admitted to the section on pediatrics, except as they may re-

quire merely partial examination, such as refraction. All surgeons are consultants. Only after it has been decided that a patient needs an operation is he transferred to a surgical service, but even then he remains constantly under supervision of pediatrists. On the fourth and fifth floors of the south wing of St. Mary's Hospital is its obstetric department. As soon as infants are born, they are placed on the pediatric service, and all postnatal care is in charge of the pediatricians. Infants dismissed from the hospital are followed in the clinic or in the Municipal Well-Baby Clinic.

The Mayo Foundation for Medical Education and Research is an organized outgrowth of the interneship, residencies, assistantships, and research work of the Mayo Clinic. The first internes in St. Mary's Hospital were under the direction only of the Drs. Mayo. In 1905 a definite policy for the development of laboratories and the improvement of the interne service was begun. In 1912, thirty-six men were pursuing a three-year course as Fellows of the Mayo Clinic. In February, 1915, the Mayo Foundation was organized and incorporated, as a result of which the Mayo Clinic took on its function as the physical plant for the teaching of graduate students in medicine, and members of the staff of the clinic became members of the faculty of the Graduate School of the University of Minnesota. Dr. L. B. Wilson became the Director of the Mayo Foundation, which position he still holds. His position is practically that of dean of the graduate medical and surgical instruction at Rochester. Originally most of the fellowships were in surgery, but as the medical work and its specialties have increased, there has been a commensurate increase in the number of Fellows pursuing studies in medicine.

At the beginning of the work, in 1921, the staff of the section on pediatrics consisted of Dr. Helmholz and Dr. Amberg, and two Fellows. At present, the section on pediatrics includes an additional consultant, Dr. Kennedy, and seven or eight graduate students who are Fellows of the Mayo Foundation, Graduate School of the University of Minnesota, and who receive an annual stipend of eight hundred dollars. They are selected from applicants who must have completed at least one year's interneship before they are eligible. The term of service is three years. The service is divided into six periods of six months each: two periods on the floor of the clinic, one period as resident at St. Mary's Hospital on the pediatric service, six months in preventive pediatrics, six months in pathology, and six months on special work, such as a thesis, if working for a higher degree, or in neurology, dermatology, or other branches.

The teaching is practically all of the preceptorial type. The Fellows working in the clinic, which would correspond to the out-patient department in a university clinic, take the history, make the examination and diagnosis, and follow the treatment, all under the direction of the consultant.

Twice a week, clinical conferences are held at which the interesting cases are demonstrated and discussed by the group. In this way each Fellow is able to follow the cases of interest during two and a half years of the three years that he spends in his fellowship. Once or twice a week the Fellows participate in hospital rounds, and once a week the various services at St. Mary's Hospital present seminars. In this way contact with other medical branches is kept alive.

For the amount of the material, an unusually large number of interesting cases and difficult diagnostic problems present themselves. Once a week, a clinicopathologic conference for Fellows is held, in which the clinical findings, diagnosis, and postmortem findings are compared.

The work in preventive pediatrics is carried on in conjunction with the Municipal Infant Welfare Nurse, the two school nurses, and the Olmsted County Public Health Association and Rochester Health Department. For the six months in which the Fellow gives his entire time to the work, his duties consist of taking charge of the local municipal Well-Baby Clinic and Preschool Clinic, which is conducted in a

special room built for that purpose in the new City Hall of Rochester. He has complete charge of the care and feeding of some 250 infants, as well as charge of the Preschool Clinic in which, annually, some 100 to 150 new patients are looked after. In addition, he spends time in examination of the school children of Rochester. Until two years ago, a member of the section also examined half of all the pupils in the schools of Olmsted County each year, but the recent wave of economy carried away the County Nurse and with it a well-organized system of examinations that had been in operation for eleven years. All children, as they enter high school, are vaccinated against smallpox and diphtheria and are given Mantoux tests for tuberculosis. This six months gives the Fellows an excellent idea of the preventive side of pediatrics.

The six months in pathologic anatomy is spent in Minneapolis, under the direction of Dr. Bell of the Department of Pathology. During this period, each Fellow has the opportunity, himself to perform from fifty to 150 postmortem examinations. He is sent out from the University Pathologic Department to perform these examinations on the bodies of children who have died in the hospitals, or elsewhere, when such examinations are requested by physicians in Minneapolis and St. Paul. During this period, the Fellow attends all the clinicopathologic conferences, as well as the ward rounds and seminars of the pediatric department, under Dr. Irvine McQuarrie. Twice a year, the members of the two pediatric departments meet, once in Rochester and once in Minneapolis, for a social get-together and a scientific program given by the local group. In this way close contact is maintained between the departments. Opportunity is also given the Fellow to make rounds in the wards for contagious diseases of the Minneapolis General Hospital.

The local service is part of the clinic service that has developed into a very important part of the Fellow's training. During his period of service the Fellow has charge of the local family practice in Rochester under the supervision of one of the senior physicians. He has opportunity to learn of the difficulties that are encountered in the home, when roentgenologic and various other examinations cannot be ordered and when he has to work out solutions with what there is at hand. Put on originally for a trial period, this service has been so favorably considered by all the Fellows who subsequently have gone out into practice that it is now one of the popular services.

The Fellows may register as candidates for the degree either of Master of Arts in Pediatrics or Doctor of Philosophy in Pediatrics. The time spent for either of the two degrees is the same, but the thesis for the degree of Doctor of Philosophy in Pediatrics is much more exacting, as is also the examination. The research activities are left to the individual. He is encouraged to follow his inclination, but if he wants to obtain a degree he must write a thesis. The Institute of Experimental Medicine offers ample opportunity for all kinds of experimental work on animals, and the clinical, pathologic, biochemical, and biophysical laboratories offer every facility for investigation.

The special advantage of the clinic is the very intimate contact maintained with all the physicians who are engaged in diagnostic work. The physicians of the various sections all have special interests, and it is of great advantage to have their opinions when conditions are encountered that are unusual in childhood but are seen commonly in adults, such as duodenal ulcer, chronic ulcerative colitis, exophthalmic goiter, and many other conditions. The situation of the section on neurology, on the floor just below the section on pediatrics, and of part of the section on urology, just a floor above the section on pediatrics, makes possible frequent personal conferences.

The work of the section is essentially clinical, and in our training of the Fellows, we aim principally to prepare men for the care of sick children and for supervision of the growth and development of the well children.

American Academy of Pediatrics

Proceedings

FOURTH ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

GENERAL MEETING

MONDAY AFTERNOON

JUNE 11, 1934

CLEVELAND MEDICAL LIBRARY

Presidential address by Dr. John Ruhräh.

Paper by Dr. Arvid Wallgren entitled, "Some Aspects of Tuberculous Meningitis and the Possibility of Its Prevention."

Business Session

Report of the Executive Board

The Executive Board recommends the following amendments to the Constitution and By-Laws:

CONSTITUTION

ARTICLE VI.

Section 1. Provision shall be made in the By-Laws for election of emeritus members.

Section 2. Emeritus members shall participate in clinical and business sessions of the Academy, but they shall not vote or hold office.

ARTICLE VI shall be changed to Article VII.

BY-LAWS

ARTICLE I.

Section 7. Add the following: "In case of any contingency arising whereby the Vice President (President-Elect) is unable to fulfill the duties of that office, the Executive Board, on recommendation of the Nominating Committee, shall be empowered to appoint his successor."

ARTICLE II.

Section 2, Line 5. Omit the words "Region 5, five years."

Section 3, Line 2. "Five" shall be changed to "four" years.

Section 4. Region I shall have the same states plus the following: Newfoundland, and Provinces of the Dominion of Canada—Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario.

Region II shall remain the same.

Region III shall have the same states plus the Provinces of the Dominion of Canada—Manitoba and Saskatchewan.

Region IV shall have the same states with the Provinces of the Dominion of Canada—Alberta and British Columbia.

Region V shall be omitted.

ARTICLE IV.

Section 4. Eliminate the words, "and they shall be urged to attend the next succeeding annual meeting when Fellowships shall be conferred."

ARTICLE VI. Emeritus Fellows, Their Qualifications, Proposal and Election.

Section 1. Any fellow of the Academy in good standing who, because of retirement from active practice or other sufficient reason, requests such action may, by vote of the Executive Board, be transferred to Emeritus Membership.

Section 2. Emeritus Fellows shall not be required to pay membership fees or annual dues.

Section 3. Emeritus members shall have the privileges of active members with the exception of voting and holding office.

"Article VI" shall read "Article VII."
"Article VII" shall read "Article VIII."
"Article VIII" shall read "Article IX."
"Article IX" shall read "Article X."
"Article X" shall read "Article XI."
"Article XI" shall read "Article XII."
"Article XII" shall read "Article XIII."

The following applications were approved:

REGION I

Dr. Norman C. Bender, Buffalo, N. Y.
Dr. Henry L. Bibby, Kingston, N. Y.
Dr. Edmund Fitzgerald, Wollaston, Mass.
Dr. David Gingold, Brooklyn, N. Y.
Dr. Thomas C. Kelly, Philadelphia, Pa.
Dr. Robert M. Lord, Providence, R. I.
Dr. William R. May, New York City
Dr. Harry Pasachoff, New York City
Dr. Margaret R. Reynolds, Jackson Heights, N. Y.
Dr. Hyman A. Slesinger, Windber, Pa.
Dr. Arthur Stern, Elizabeth, N. J.
Dr. Edwin D. Weldon, Bridgeport, Conn.
Dr. Frank L. Fletcher, Glen Falls, N. Y.
Dr. Cole B. Gibson, Meriden, Conn.
Dr. Alfred C. Henderson, Stamford, Conn.
Dr. E. L. Noone, Drexel Hill, Pa.
Dr. E. Kearny Smith, Lancaster, Pa.
Dr. Arthur A. Cower, Meriden, Conn.
Dr. Harold Abramson, New York City
Dr. Manning C. Field, Brooklyn, N. Y.
Dr. David Gaberman, Hartford, Conn.
Dr. Harry A. Naumer, Brooklyn, N. Y.
Dr. Robert T. Rogers, Greenwich, Conn.
Dr. Abraham S. Small, Boston, Mass.
Dr. Louis A. VanKleeck, Manhasset, N. Y.
Dr. Arthur A. Tower, Meriden, Conn.

REGION II

Dr. Charles E. Abbott, Tuskaloosa, Ala.
Dr. Samuel A. Anderson, Jr., Richmond, Va.
Dr. Wm. W. Anderson, Atlanta, Ga.

Dr. Harry S. Andrews, Louisville, Ky.
Dr. Lee Bivings, Atlanta, Ga.
Dr. J. Lewis Blanton, Fairmont, W. Va.
Dr. Fannie Lou Brittain-Leney, Oklahoma City, Okla.
Dr. Walter D. Brown, Beaumont, Texas
Dr. John K. Bullock, Jackson, Miss.
Dr. Tom F. Davenport, Atlanta, Ga.
Dr. Louie O. Godley, Fort Worth, Texas
Dr. Lucius D. Hill, Jr., San Antonio, Texas
Dr. Joel J. Hobson, Memphis, Tenn.
Dr. Lewis D. Hoppe, Jr., Atlanta, Ga.
Dr. Alexander Crump Kirby, Little Rock, Ark.
Dr. Chester E. Kitchens, Texarkana, Texas
Dr. George W. Kutscher, Jr., Asheville, N. C.
Dr. R. A. Moore, Charlotte, N. C.
Dr. Ben H. Nicholson, Oklahoma City, Okla.
Dr. William W. Nicholson, Louisville, Ky.
Dr. James Carney Overall, Nashville, Tenn.
Dr. Julian P. Price, Florence, S. C.
Dr. Walker L. Rucks, Memphis, Tenn.
Dr. Irving Joe Spitzberg, Little Rock, Ark.
Dr. Caleb O. Terrell, Fort Worth, Texas
Dr. Talbot A. Tumbleson, Beaumont, Texas
Dr. Sam P. Wainwright, Birmingham, Ala.
Dr. Thomas Mervelle Watson, Greenville, N. C.

REGION III

Dr. Donald J. Barnes, Detroit, Mich.
Dr. I. Pat Bronstein, Chicago
Dr. James F. Clancy, Hammond, Ind.
Dr. Robert J. Cooper, Pontiac, Mich.
Dr. George E. Dash, Cincinnati, Ohio
Dr. Lloyd K. Felter, Cincinnati, Ohio
Dr. Horace L. French, Lansing, Mich.
Dr. Emanual Friedman, Denver, Colo.
Dr. G. E. Harrison, Mason City, Iowa
Dr. Luther P. Harsh, Akron, Ohio
Dr. A. Benjamin C. Hoyer, Cincinnati, Ohio
Dr. John H. Hunt, Cincinnati, Ohio
Dr. Dennis H. Kelly, Des Moines, Iowa
Dr. Robert H. Kotte, Cincinnati, Ohio
Dr. Herman F. Meyer, Chicago
Dr. Walter R. Moore, St. Joseph, Mo.
Dr. Henry G. Poncher, Evanston, Ill.
Dr. George Rehner, Jr., Cincinnati, Ohio
Dr. Charles L. Shafer, Mansfield, Ohio
Dr. David M. Siperstein, Minneapolis, Minn.
Dr. Norman T. Welford, La Grange, Ill.

REGION IV

Dr. George B. Kryder, Glendale, Calif.
Dr. Vivian Tappan, Tucson, Ariz.

Dr. Jessie M. Bierman, San Francisco, Calif.
Dr. Benjamin F. Feingold, Los Angeles, Calif.
Dr. Paul M. Hamilton, Alhambra, Calif.

REGION V

Dr. Alton Goldbloom, Montreal, Quebec
Dr. Geo. Alex. Campbell, Ottawa, Ontario
Dr. T. Crossan Clark, Hamilton, Ontario

EMERITUS MEMBERS

Dr. A. C. Eastman, Sarasota, Fla.
Dr. Walter R. Ramsey, St. Paul, Minn.
Dr. Louise Taylor Jones, McLean, Va.

The report of the Auditor was reviewed and accepted.

The following appointments were made as a committee to represent the American Academy of Pediatrics at the International Congress to be held in Rome in 1936: C. Anderson Aldrich, Clifford G. Grulee, L. R. DeBuys.

It was voted to approve the following resolution presented by the Southern Medical Association:

"WHEREAS, investigations reveal information that nutritional deficiency is constantly assuming a more important rôle as the etiological factor of many diseases that have heretofore not been understood; and as it is not known that there are present in the United States a great many diseases belonging to this group, some of which diseases are widespread, increasing in number, and seriously undermining the health and vitality of the people of this country; and

"WHEREAS, we have little definite knowledge of the chemistry of our foods, because analyses which have been made in order to determine their nutritional value have been local or sectional and no sustained effort has been made upon a broad scale to supply such information as is necessary in order to determine the localities from which our food supply should be drawn; and

"WHEREAS, it is known that in certain localities and under certain circumstances the chemical elements of common foods such as milk, fruits, vegetables, and cereals, show marked differences in value while it is known that in other localities certain vegetables absorb poisonous substances which render them of doubtful food value; and

"WHEREAS, no real progress can be made in the solution of nutritional deficiency diseases until chemical analyses of foods are made upon a broad and impartial scale and the relationships of the different chemical elements studied with scientific care; and

"WHEREAS, the whole scientific world is aroused to the importance of this fundamental work in order that grave public health problems and the vitality and strength of the people of this nation be safeguarded; therefore be it

"*Resolved*, That the federal authorities be urged to undertake this work upon a broad, comprehensive, and impartial scale in collaboration with selected medical colleges in the different sections of the country."

The committee appointed last year to recommend procedures for specific immunization against communicable diseases has nearly completed an outline of this subject which will be submitted in the near future.

J. E. GORDON
JOHN TOOMEY
E. B. SHAW

Report of the Secretary

This is but the fourth annual meeting of the American Academy of Pediatrics and its membership has grown to approximately 650. Its influence on Pediatrics in the United States has been very great, and it is just beginning to be felt. National organizations are beginning to look to the Academy for support, advice and cooperation.

In the states the members of the Academy are taking active part in nearly all of the activities for children. This varies in different states, but only in degree. We have members in every state except North Dakota, Montana, and Arizona. An application from one of these states is pending. We have members in Canada and in the Hawaiian Islands. The Academy is a going concern, not only as to receiving the support of its membership, but it is also receiving the support of pediatricians who are not members.

The ideals of the Academy have been different from those of other societies, and as a consequence there has been some difficulty in getting to the membership a proper conception of the purposes for which the Academy was organized. This period is quickly drawing to a close. Very few of the members but realize the importance of the organization and the necessity for its existence. It is a noteworthy fact that the pediatricians of this country have responded so well to this organization during the period of extreme financial depression. It is certainly a child born during a period of adversity.

There has been some question among the members as to the financial policy which has been followed. Few realize that the fifteen dollars yearly dues include a Journal which costs eight dollars to a nonmember, so that in reality the dues at present amount to but seven dollars yearly. Members of other general societies with the character of this one pay much more in dues than we do, and their initiation fees are greater. In spite of this fact the Academy has gone ahead and achieved notable success in several lines. The Journal has already been mentioned. The work of the Committee on Medical Education has had its effect upon the curriculums of the medical schools and was able to step into the breach when it became necessary to organize a Board of Pediatrics for certifying pediatricians in order to prevent this from being done in a haphazard way by the different states in the Union. We have made hospital surveys; we have cooperated with various movements in the various states for the good of the child, and we hope to be able to function more definitely along other lines in the near future.

The Secretary has made several trips during the past year; one to Salt Lake City and Los Angeles for the meeting of Region IV; one to Memphis and another to Spartanburg, S. C., and Atlanta in Region II. He has also, of course, been present at the meeting of Region III and met with the Detroit group of Region III. It is a significant fact that the Central States Pediatric Society decided to go out of existence in view of the fact that the membership of Region III so closely paralleled it. It is also of interest that Region I proposes to hold an annual meeting beginning this fall which will probably cooperate with one of the organizations in the East.

The Society has made very little progress in Canada and the proposal of the Canadian group is before you in the Report of Region V. It seems not unlikely, however, that the Canadian membership will increase in the not distant future.

The Secretary does not believe that he is exaggerating when he reports that the enthusiasm for the Academy among the membership has greatly increased during the past year. More and more the members are beginning to realize what it is all about, to show much greater enthusiasm and cooperation than was evident at the start.

At the meeting in Chicago last June, forty-one were admitted to the membership. At the meeting of the Executive Board on December 2, fifty-six were admitted to membership.

During the past year the Society has lost by death Dr. Alfred F. Hess of New York City and Dr. Harrold A. Bachmann of Chicago.

Respectfully submitted,

CLIFFORD G. GRULEE,
Secretary.

Report of Treasurer

STATEMENT OF RECEIPTS AND DISBURSEMENTS

June 1, 1933 to May 31, 1934

Balance, June 1, 1933		$ 2,885.80
Receipts		
Initiation fees	$ 3,740.00	
Dues	8,490.15	
Loan to American Board of Pediatrics	1,500.00	
Exhibits	1,085.00	
Transferred from Savings Account	2,000.00	
Interest on Government Bonds	300.00	
Interest Bank Account	.39	
		17,115.54
		$20,001.34
Disbursements		
Salaries		
Secretary	$ 4,800.00	
Stenographic Service	1,620.00	
Subscriptions to Journal	2,945.00	
Loan to American Board of Pediatrics	1,500.00	
Annual Meeting	1,052.73	
Postage	315.00	
Printing and Stationery	317.31	
Mimeographing and Office Supplies	94.79	
Traveling Expense	334.60	
Insurance	62.50	
Telephone and Telegrams	28.35	
Rent of Office Space	20.00	
Refund	5.00	
Tax on checks	2.62	
Exchange on checks	2.68	
Miscellaneous Expense		
Executive Board	317.46	
Region I	208.37	
Region II	106.93	
Region III	171.54	
Region IV	12.35	
States	119.48	
Committee on Hospitals and Dispensaries	18.55	
Committee on Medical Education	10.00	
"Festschrift"	200.00	
		14,265.26
Balance, May 31, 1934		$ 5,736.08

Total Cash

Balance	$ 5,736.08
U. S. Government Bonds	10,682.95
Savings Account	3,412.93
	$19,831.96

Report of Region I

The membership of Region I now totals 208. A steadily growing interest in the Academy and its aims is very apparent and augurs well for the future. When one considers the difficulties due to the economic situation, to the lack of understanding on the part of some, and the failure on the part of others to realize the far-reaching effects for good when all pediatricians can act in concert, the future can be faced without any misgivings.

A conference is to be held shortly by the Regional Chairmen with representatives from the New England Pediatric Society, the Philadelphia Pediatric Society and the Pediatric Section of the New York Academy of Medicine with the view of having an Annual Meeting in the East under the combined auspices of the former societies which held the Tri-City meetings. It is hoped to be able to provide for wider participation by pediatric groups than has hitherto been possible and to develop in the East a greater consciousness of the wide scope and importance of the care of the whole child.

If this development matures, it would seem wise to include the eastern part of Canada in Region I as in every way that will be desirable.

The State Chairmen report progress in various ways. Each state is attempting in a different way to make the force of Pediatric opinion felt in matters that concern children and endeavoring as far as possible to extend its sphere of usefulness.

Respectfully submitted,

LOUIS C. SCHROEDER,
Regional Chairman.

Report of Region II

In making my report for this region, I wish to thank the President, Secretary, State Chairmen, and individual members of the Academy for their support during this past year.

The President, Dr. John Ruhräh, met with us at our regional meeting in Richmond, Va., November 15, 1933, and gave us a talk at the banquet on the subject of "Poliomyelitis." His presence did a great deal toward making the meeting a success. Dr. Ruhräh has also corresponded with the State Chairmen throughout the year and on a number of occasions has answered individual inquiries from members of the Academy in this Region.

Dr. Grulee, our Secretary, met with us at the Georgia State Meeting in March of this year.

Enthusiasm in the Academy seems to be more on the increase than on the wane as attested by applications for membership. A great many men were kept out of the Academy for some time because of finances, but lowering the initiation fee this year has given quite a few the opportunity of joining.

In last year's report there was one state that was still not organized. I am glad to report this state, Arkansas, has now organized and has a State Chairman, Dr. Morgan Smith, Little Rock, who has been quite active. There are two applications on file from this state. I am sure within the next year this state will have a definite pediatric program under the auspices of the Academy.

We are glad to report progress in most of the states. Reports have been received from all of the states.

The meeting at Richmond this year was the day before that of the Southern Medical Society and was well attended and consisted of a business meeting in the afternoon in which the policies of the Academy were thoroughly discussed. As the

proceedings of this meeting were published in the Journal, they will not be given in detail here. It was decided that the next meeting would be held in San Antonio, Texas; that the Academy would meet one day before the Section of Pediatrics of the Southern Medical Association; the program at this time to consist of a morning of clinics, given by the members of the Academy in Texas; the afternoon session to consist of four or five round table discussions; subjects to be announced later. A program committee consisting of Drs. Casparis, Weston, and Davison, was appointed by the Regional Chairman to work out the details of this program. Later in the afternoon, after the round table discussions, there will be a general meeting of members of the Academy with the Regional Board for the purpose of discussing the policies for next year. At night there is to be another joint banquet with the Pediatric Section of the Southern Medical Association at which a talk, similar to the one last year will be given.

The members of the Regional Board do not feel that the purpose of the Academy is to hold a clinical session of this type, yet, in order to enlist interest of the members such sessions are entirely necessary.

We are still having the problem in this region as to who shall be responsible for the health of the infant, the Health Department, or the practicing physician. We have tried to obviate to some extent this problem by the meeting we had in Birmingham with the health commissioners a year or two ago. While this session was quite enthusiastic, I am sorry to say the enthusiasm has died down some since the original conclave. Unfortunately, this last year the health authorities were unable to meet with us again because of a conflict in dates, but we hope to have them with us next year.

Most of the pediatricians feel that only by mutual understanding can much good be accomplished. I think the same idea prevails among both factions; that the function of the health department is to educate the public; the physician, that of carrying out the recommendations.

I merely mention this to show that in some sections of the region much good has been accomplished by this mutual interchange of ideas and that we intend to continue working along this line.

As Regional Chairman, I have been privileged to meet with the Academy members of the states of Tennessee, Georgia, and Mississippi during the past year and can report much enthusiasm in all three sections.

In closing I would like to state that my reaction after serving as chairman of this region for two years is that the success of the Academy in each state depends entirely upon the judgment and activity of its State Chairman; that the members will only be active and take an interest in those states where the chairman is on the job. I think this will be evidenced by the following reports by states. Each state has its own problems and must work out its own methods of meeting these problems. After all the states become active, then a general regional plan can be adopted.

REPORT OF STATES

Arkansas.—State Chairman, Dr. Morgan Smith, Little Rock. Active members, 1. Applications for membership: Dr. Irving J. Spitzberg, Little Rock, and Dr. Alexander Crump Kirby, Little Rock.

Arkansas has no State Pediatric Society; has no organized pediatric activities under the direction of the Academy. I believe there will be a different report next year.

Alabama.—State Chairman, Dr. Clifford L. Lamar, Birmingham. Active members, 7. Applications for membership: Dr. Sam P. Wainwright, Birmingham, and Dr. Charles E. Abbott, Tuscaloosa.

The Academy has not been active in this state. Last fall some interest was aroused in the giving of a Clinic Week in Birmingham. The clinic was held at the County General Hospital and the pediatric part of it was given for the most part by Academy members. It was the original idea that the clinic would be solely a pediatric postgraduate demonstration, but the hospital authorities thought so well of it that medicine, surgery, and obstetrics were included.

Alabama has a State Pediatric Society which is not a part of the State Medical Association, but holds its meetings at the same time for convenience. The State Pediatric Society welcomes all men who are interested in the study of child welfare and does not limit its membership to those practicing especially pediatrics.

Florida.—State Chairman, Dr. Luther W. Holloway, Jacksonville. Active members, 9. Applications for membership, none.

The membership of the Florida section of the Academy is composed of seven pediatrists. There are three members in Miami; two members in Tampa; one member in Orlando; and two members in Jacksonville.

No meeting of all members has been held. At times informal discussions have been held by two or three members pertaining to the pediatric problems in our state.

In the city of Jacksonville and in the surrounding areas efforts have been made to emphasize the advantages of systematic, minimum periodic examinations of the infant from birth on through early childhood. Stress has been laid on the necessity of early immunization against diseases which are prevalent during the preschool period. The local effort has been to convince the mothers that many of the defects found when children enter school can be prevented or minimized if systematic observation is carried out during the child's early life.

All of the local pediatrists have given many practical talks to numerous Parent-Teachers' Associations and Mothers' Clubs along the line of preventive pediatrics.

A meeting of the Academy will be held in Jacksonville during the meeting of the State Medical Association early in May. At this meeting a definite program will be projected for the state of Florida.

Georgia.—State Chairman, Dr. M. Hines Roberts, Atlanta. Active members, 9. Applications for membership, none.

The membership of the Academy in Georgia is still small; hence, the activities of this organization have been carried on chiefly with the cooperation of the Georgia Pediatric Society whose membership includes practically every man in the state practicing Pediatrics.

The work accomplished has been along the lines given in the report from this state last year:

1. Education of the medical group:

a. In conjunction with the State Health Department and the two medical schools, five pediatric extension courses were given in certain strategic towns of the state. Preventive pediatrics in its various phases was discussed and correlated with the actual facts concerning infant mortality in Georgia. Thirty to fifty physicians attended each of these meetings.

b. Speakers from the pediatric group were supplied for each of the twelve annual district meetings throughout the state.

c. A most successful innovation was the first annual scientific meeting of the Georgia Pediatric Society held in Atlanta in October, 1933. The guest speakers on this occasion were Dr. Charles Gilmore Kerley, New York, Dr. Horton Casparis, Nashville, and Dr. Arthur Abt, Chicago. Approximately one hundred men from over the state attended the entire meeting, and for the evening meeting well over two hundred were present.

2. Education of the laity:

a. At the same time that the five extension courses were given in the various towns of the state for the profession, one or two hours was set aside for a conference with the women of the community interested in child welfare. These conferences were enthusiastically received and well attended.

b. Parent-teacher organizations were reached throughout the state either directly by the physician or through the cooperation of the Woman's Auxiliary of the Medical Association of Georgia. In the latter instance the data presented were prepared by the pediatric group and submitted to the local chairman in pamphlet form. Approximately 150 meetings were held, reaching about 15,000 women.

c. Beginning the first Sunday in January and continuing each week thereafter, timely articles on pediatric problems have appeared on the editorial page of the *Atlanta Constitution*. They have stressed always the preventive phases of the subject in hand. These articles have been reprinted in many of the smaller papers throughout the state and have received much favorable comment. Just how long they will be continued will depend upon the demand.

The Secretary of the national organization, Dr. Clifford Grulee, and our Regional Chairman, Dr. E. C. Mitchell, met with the state pediatric group in Atlanta on March 22. Representatives of the various organizations throughout the state interested in child welfare were invited to attend the luncheon at which the two speakers outlined the aim of the Academy, both national and local. Much interest was displayed, not only by the professional but by the lay groups also.

At a conference following this luncheon the leaders of the various lay organizations expressed their enthusiasm for the plans and aims of the Academy and consented to act as a permanent committee to further various child welfare projects. This committee will meet again in the week of April 23, at which time concrete plans will be presented for an educational program of child health. Due to lack of funds it has been impossible for the Academy to conduct its study on infant mortality.

Plans for the coming year:

Practically all of the work carried out last year will be continued. Extension courses conducted in conjunction with the State Department of Health and the medical schools will be considerably broadened. Working in cooperation with the Children's Bureau, which contemplates quite an extensive child health program in the state with C. W. A. funds, we plan to hold in various sections of the state Child Health Days similar to those conducted in Tennessee. Both the profession and laity will be reached. The State Chairman has already held several conferences with the Director of the State Board of Health and representatives of the Children's Bureau. It is believed that the Georgia Pediatric Society will lend its full cooperation to this project, enabling us to carry these programs to many sections of the state.

Further activity in the education of the profession will be two days devoted to pediatric subjects during the annual week of postgraduate training conducted by Emory University the first of June. These postgraduate courses are generally well attended and reach many men from the rural sections of the state.

(Although the membership of this state is very small, there are a number of very good men limiting their work to pediatrics in the state of Georgia. I was privileged to attend a meeting called by the Academy State Chairman at which were present all pediatricians whether members of the Academy or not, along with all health workers and lay workers interested in the subject of child health. There was a great deal of enthusiasm as you can see from the above program. Georgia is doing good work. This is in no small amount due to the State Chairman. It is my opinion that within the next year we will receive several applications from this state.)

Kentucky.—State Chairman, Dr. Philip F. Barbour, Louisville. Active members, 5. Application for membership, Dr. William W. Nicholson, Louisville.

There are only one or two other men eligible for membership, and these are being seen.

Dr. Barbour is Chairman of Postgraduate Instruction for the State Medical Association and in cooperation with the Association has planned a number of lectures on pediatrics throughout the state and also addresses before various clubs and organizations. A number of these talks have already been made. They are awakening public interest in health matters in relation to children. Dr. Barbour, as Chairman of the Pediatric Advisory Board to the Department of Maternal and Child Welfare of the State Board of Health, states they are getting in active contact with the Parent-Teachers' Associations throughout the state and they have the fullest cooperation of the State Board of Health in their efforts for education and publicity. Seventy-seven of Kentucky's 120 counties receive the full-time health service of a doctor and nurse. Five members constitute the County Boards of Health. Three of the five members are appointed by the State Board of Health. As the result of intensive work in immunization against diphtheria the Parent-Teachers' Association of Kentucky last year received a silver trophy for the highest percentage of immunization against diphtheria in children.

While the membership of the Academy in this state is small, they are planning very actively for child health service.

Louisiana.—State Chairman, Dr. Robert A. Strong, New Orleans. Active members, 14. Applications for membership, none.

This state has had an active Pediatric Society for more than ten years. The membership is not confined to men doing pediatrics exclusively, but is open to all men interested in the subject of child health. This Society meets in connection with the State Society, but functions as an independent organization.

The activities of the Academy in Louisiana this year were centered around the annual meeting of the Louisiana State Pediatric Society, which was held in Shreveport, Monday, April 9, just before the meeting of the Louisiana State Medical Society. While not particularly well attended, the meeting was regarded by those present as being interesting and instructive, and there emerged from it several plans which it is believed will stimulate further interest in pediatrics in the state, and result in a closer cohesion between those working in pediatrics.

The meeting was held in the Washington-Youree Hotel in Shreveport, with Dr. Cecil Lorio, Baton Rouge, presiding. The program was opened by the State Chairman of Louisiana, who talked on "Pediatric Organization." After reviewing briefly the history of pediatrics in the past three decades, the importance of pediatricians being thoroughly organized for the purpose of controlling and regulating pediatric problems in the State of Louisiana and in every way safeguarding the interests of the American Academy of Pediatrics in this state was emphasized.

The second paper, on the "Etiology of Malocclusion of the Teeth," was given by Dr. C. W. Williams of Shreveport. The third paper was a discussion of "Thyrotoxicosis in Children" by Dr. Charles J. Bloom of New Orleans. In addition to this there were several informal discussions of subjects of current interest in pediatrics.

Dr. John Signorelli, New Orleans, was elected President for the coming year, and Dr. C. T. Williams, New Orleans, was elected Vice President, and Dr. E. A. Socola, New Orleans, was elected Secretary.

There is every reason to believe that with the improvement of the recent economic turmoil interest is awakening in the American Academy of Pediatrics, and it is believed that one or two men in Louisiana who are eligible for membership will soon see their way clear to apply.

One of the plans which came out of this meeting was a suggestion to organize pediatric clubs in New Orleans, Baton Rouge, and Shreveport, and if feasible, to have one of these clubs act as host to the others for a simple get-together meeting at which formal round table discussions of pediatric problems will be the feature. It is hoped that by the next annual report, this venture will be realized.

Mississippi.—State Chairman, Dr. Noel C. Womack, Jackson. Active members, 4. Application for membership, Dr. John K. Bullock, Jackson.

I am glad to report that this has been one of the most active of all states in this Region during the past year. Dr. Womack and other members of this state are entirely responsible for the pediatric activities. They are doing excellent work, and I believe will have a definite program next year.

Dr. Womack reports that through the efforts of the Academy in the state, there has been organized the Mississippi State Pediatric Society of which an Academy member is President, and another Vice President. This society is an independent society and not a part of the State Medical Society. It has eleven members at present. The Mississippi State Pediatric Society has virtually completed plans to put on an educational campaign throughout Mississippi in preventive medicine, in cooperation with the extension departments of the University of Tennessee, for north Mississippi, and Tulane University in south Mississippi. It is the purpose of the Mississippi State Pediatric Society to cooperate in every possible way with the Academy to advance the interest of pediatrics. There are quite a few young pediatricians who limit their work to pediatrics and have signified their intention of joining the Academy as soon as they are eligible.

North Carolina.—State Chairman, Dr. J. Buren Sidbury, Wilmington. Active members, 9. Applications for membership: Dr. George W. Kutscher, Jr., Asheville, and Dr. Thos. M. Watson, Greenville.

The State Chairman reports that there are several other applications which will probably be in soon.

North Carolina has a definite, active society known as the North Carolina Pediatric Society. It meets twice a year and holds clinics. Last year it met at the Babies' Hospital, Wrightsville Beach, and Dr. W. McKim Marriott conducted the clinic before a full representation of the society. Everyone enjoyed the meeting very much. There are thirty-three members of the North Carolina Pediatric Society at the present time. It is a separate and distinct entity. It is not the pediatric section of the North Carolina State Society, but once a year holds a meeting at the same time and place as the Pediatric Section of the Society.

Different members of the American Academy of Pediatrics assist each year in conducting preschool clinics over the state. An effort is made to see that the child when he first enters school has a physical examination and record made before he enters. Advice is given as to medical treatment. In other sections of the state members of the Academy have assisted health officers in holding tubercular school clinics. In these clinics children are given the tuberculin test and all those with positive reactions are x-rayed and their plates read by competent radiologists. Their advice is relayed back to the physician in charge.

Last year a campaign was conducted in Wilmington where the repeaters in a number of schools were examined both for physical defects and intestinal parasites.

About 20 or 25 per cent of the repeaters were found to have some form of intestinal parasites. This information was turned over to the school authorities who in turn advised the parents to see either their family physician or the local health department if they were unable to pay the physician.

Oklahoma.—State Chairman, Dr. Clark H. Hall, Oklahoma City. Active members, 8. Applications for membership: Dr. Fannie Lou Brittain-Leney, Oklahoma City, and Dr. Ben Nicholson, Oklahoma City.

Dr. Hall hopes to have several more applications for membership as there are several men who are now eligible.

The State Pediatric Society has been in existence for seven years and is a separate society from the State Medical Society. The members are pediatricians and those general men that are interested especially in pediatrics. There are about thirty members in good standing in this society. They meet the first day of the general state meeting each year. The relationship of the Academy and the Pediatric Society is most cordial. Pediatric activities have not been as active as they would like them. The Oklahoma Society for Crippled Children has held several clinics over the state and much good comes from these clinics. Postgraduate pediatric work has been given in several towns under the supervision of the State Medical Society. In the past much work of this type has been given by the State Society and the Extension Department of the University. The Board of Regents has now ruled that chiropractors must be admitted if the university carries part of the expense. The Medical Society is doing as much as it can alone. Things seen to be picking up in Oklahoma, and it will not be long before they begin to accomplish something really worth while. Dr. Hall states that the Governor of the state will not allow any program carried on with state funds unless he has something to do with it and it is impossible to do anything with him or his health department. We believe Dr. Dunham ran up against some difficulties with him while she was in Oklahoma and found out how impossible it was to put on any worth-while programs.

South Carolina.—State Chairman, Dr. J. I. Waring, Charleston. Active members, 6. Application for membership, Dr. Julian P. Price, Florence.

Last year Dr. Waring stated they have organized a central committee for South Carolina. It is composed of Dr. R. L. McCrady, obstetrician, Charleston, Mrs. H. M. Rubin, a woman prominent in Parent-Teacher and similar state-wide organizations, and Dr. D. J. Barton, Anderson, general practitioner interested in pediatrics and appointed by the President of the State Medical Association as official representative on the committee. I do not believe, though, that this committee has functioned as yet. There seems to be quite a number of prospects for membership. The pediatric activities are confined largely to the South Carolina Pediatric Society, which is independent of the state association. Its membership is not confined to pediatricians, and the usual attendance at its meeting is in the neighborhood of twenty-five or thirty. Its members are all members of the state association. It has at present no official relationship to the Academy.

Tennessee.—State Chairman, Dr. H. R. Casparis, Nashville. Active members, 14. Applications for membership: Dr. James Carney Overall, Nashville, Dr. Walker L. Rucks, Memphis, Dr. Joel J. Hobson, Memphis.

This state has a Pediatric Society which meets on the first day of the State Medical Society. It functions separately. The membership is not confined to those doing pediatrics exclusively, but all men interested in child health are accepted as members and urged to attend the meetings.

The city of Memphis also has a Pediatric Society composed of eighteen members, all limiting their work to pediatrics. This Society meets monthly throughout

the year. The University of Tennessee staff has bimonthly meetings at which time a complete study is made of all the cases of interest handled on the charity services of the two charity hospitals and all deaths are carefully analyzed.

As reported last year, the President of the State Medical Society of Tennessee requested each of the councilors to set aside one or two meetings a year in his district to be devoted to "preventive pediatrics." Teams were to be sent out composed of one or two pediatricians, an obstetrician, an otolaryngologist, and a dentist. These teams were to be appointed from the University of Tennessee in western part of the state and Vanderbilt University for the eastern part.

We are glad to report that three meetings were held in the western part of the state. In the afternoon the meeting was devoted to mothers; in the evening the doctors from all over this councilor's district were present. At the first meeting in Dyersburg, there were seventy-five mothers present in the afternoon and forty-five doctors in the evening. The meeting was enthusiastically received. A feature that worked out particularly well was the so-called "question box." Each mother was given a slip of paper when she came into the room and told to write some question relative to the talks if she cared to. This part of the program really occupied more time and brought out more practical points than the lectures. At Henderson, there were about one hundred mothers present and thirty doctors. At Savannah, there were twenty doctors and in the neighborhood of two hundred mothers present.

We have several more meetings scheduled later on and have been requested to make return engagements at all three places attended this year. I believe this movement has great possibilities. Have not received a report yet of the activities in eastern Tennessee.

This movement was so well thought of we have been requested by the State Chairman of Mississippi to inaugurate such a plan from the University of Tennessee in the northern part of his state and Tulane University to take over the southern part of the state. A great many of the doctors who have attended these meetings have requested that some form of postgraduate instruction in pediatrics be instituted, either in the form of a seminar or a short course at the state university.

Owing to the fact, as you will see by the map survey of the state of Tennessee on scientific exhibit, that there are so relatively few pediatricians in this state, the bulk of child health programs must be carried by the general practitioner; hence the future would seem to depend on the education of the doctor to institute such a program and the laity to demand such service.

The State Department of Health of Tennessee is cooperating very well in pediatrics. The greatest trouble we are having is with the overenthusiastic health nurse and county health officer who are soliciting immunizations and otherwise encroaching on the prerogatives of the doctor, thereby causing some enmity. We hope to iron this out soon.

Several of the younger men of this state have expressed a desire to join the Academy as soon as their time limit is up. Quite a number of the pediatricians have inquired as to the routine of the Board of Certification. I think all the pediatricians will ask for certification soon.

There is but one meeting a year of the Academy and that is held at the same time as the State Pediatric Society.

Texas.—State Chairman, Dr. James H. Park, Jr., Houston. Active members, 18. Applications for membership: Dr. Chester E. Kitchens, Texarkana; Dr. Walter D. Brown, Beaumont; Dr. Talbot A. Tumbleson, Beaumont; Dr. Louie O. Godley, Fort Worth.

The Texas State Pediatric Society has seventy-six active and associate members, including those members who belong to the American Academy of Pediatrics.

The Academy in Texas works in harmony with the Texas Pediatric Society, the Texas Obstetric Society, the Houston Academy of Medicine, and the State Medical Association.

Dr. Park states that he participated in two sessions of the Texas Conference on Child Health and Protection at Austin, February 9, 1934, and presided at the general evening meeting on that day.

The Texas Pediatric Society is a part of the State Medical Society, five papers being allotted to the subject of pediatrics at each annual meeting. Last year, Dr. Lucius Hill, Jr., pediatrician of San Antonio, was chairman of the Section on Medicine and Pediatrics, the first time to my knowledge that a pediatrician has been so honored in Texas.

Virginia.—State Chairman, Dr. J. B. Stone, Richmond. Active members, 16. Application for membership, Dr. Samuel A. Anderson, Richmond.

The work of the American Academy of Pediatrics in Virginia has consisted of the cooperation of its members with other organizations in the state that are concerned with Child Welfare.

The Virginia Pediatric Society has approximately fifty members and includes in its membership the sixteen members of the Academy. The Virginia Pediatric Society through its Child Welfare Committee has been endeavoring to promote an educational program that will stimulate the interest of the medical profession in Child Welfare work.

The Bureau of Child Welfare of the State Health Department and the Bureau of Mental Hygiene of the State Department of Public Welfare have done much to arouse public interest in child health. It has been the aim of the Pediatric Society, including members of the Academy, to bring about a corresponding and cooperative interest on the part of the physicians of the state in the work of the above departments.

The Medical Society of Virginia has a Department of Clinical Education whose function is to stimulate interest in, and assist in the holding of, scientific programs by its component county and group societies. During the past two years the department has carried out a very helpful program of obstetric instruction through the service of a full-time field clinician. The physicians of the state have expressed a desire for similar instructions in pediatrics, and it is planned to put on such a program if, and when, funds are available for financing it. In the meantime, there is in prospect a plan of pediatric instruction under the auspices of the Department of Clinical Education, utilizing as instructors eighteen members of the Virginia Pediatric Society, including members of the Academy, who have volunteered their services for lectures and demonstrations.

Besides the above educational activities, the Medical Department of the University of Virginia and the Medical College of Virginia, respectively, conduct each year short postgraduate courses, in which pediatrics is included.

In the absence of any financial backing it has been the opinion of the Academy members in the state that more could be accomplished by supporting the above organization, especially the Department of Clinical Education of the Medical Society of Virginia, than by undertaking any independent program.

The Virginia Pediatric Society is not a part of the Medical Society of Virginia, but holds its annual meeting at the same time and place as the state society. This Society has about fifty members, though all of these do not limit their work to

pediatrics. All of the Academy members are members of the Pediatric Society. Except for the overlapping of membership, the organizations have no official connection.

West Virginia.—State Chairman, Dr. John T. Thornton, Wheeling. Active members, 4. Application for membership, Dr. J. Lewis Blanton, Fairmont.

The West Virginia State Pediatric Society was organized about three years ago. It is a section of the West Virginia Medical Society. It has not definitely taken any active part in any health movement. However, the society takes an active part in the West Virginia White House Conference.

In May, 1933, there was held in Charleston, W. Va., the West Virginia White House Conference. A report on this Conference was made last year. During the past year there has been considerable follow-up work. The following are especially noteworthy:

1. In Harrison County a Health and Nutrition Program sponsored by Dr. Robert C. Hood. This program included:

a. Inspection by nurses in the schools and the traditional school nursing program.

b. Health education.

c. First-aid and safety program.

d. Hot-lunch feeding program.

2. In Kanawha County an immunization program sponsored by Dr. M. F. Petersen and Dr. A. A. Shawkey.

3. In Cabell County a rather extensive school health program sponsored by Dr. George Lyon, Dr. R. McK. Sloan, and Dr. W. Byrd Hunter.

4. In Marion County a school health program sponsored by Dr. J. L. Blanton.

On May 14, 1934, the Section on Pediatrics of the West Virginia State Medical Society was held in Huntington, W. Va. At that meeting papers were presented by Dr. M. F. Petersen and Dr. R. C. Hood of West Virginia and by Dr. W. J. Aycock and Dr. C. F. McKhann of Boston, Mass. All the papers dealt with immunization and school health programs.

In opening this report I thanked the State Chairmen and individual members of the Academy for their support during the past year. In closing I would like to make a few recommendations that might lessen the difficulties of the Regional Chairman.

1. Please get in your reports and answer correspondence more promptly.

2. Notify the men of your state that in making out an application for membership the following points must be observed before I can send applications through: First, the applicant must have five years exclusively in pediatrics; an interneship in pediatrics or residency in pediatrics alone is accepted, but not a general interneship. Second, two members of the Academy must sign the application. Third, letters of recommendation must come direct to me separately from the signers of each application. The application is held up until these letters are received.

3. I should also like to make it known to the State Chairmen and the members individually, that $2.00 is allocated for each member in your state for the use of state organization. This has not been requested by any of the states as yet. Perhaps there may be some small movement where this would be useful.

4. I am always glad to hear any difficulties of the State Chairmen and to advise in any way possible and promise to answer all correspondence at once.

Respectfully submitted,

EDWARD C. MITCHELL,
Regional Chairman.

Report of Region III

The success of the Central States Pediatric Society founded on an annual clinical meeting of five sessions has made Region III conscious of the necessity of continuing this type of meeting if we are to gather into our membership all those former members of the Central States Society who are eligible. By a vote of the Regional Committee, the meeting in the fall of 1934 will be held in Rochester and Minneapolis on October 4, 5, and 6. In addition to the usual clinical sessions, two in Rochester and three in Minneapolis, it is hoped that we will have at least two speakers of national repute interested in work with children other than that strictly medical. The invitation to all members of the former society should help interest them in membership in our Society. We hope for an intensive membership follow-up at that time.

At the December meeting, twenty-one new members were added to the list of Region III; since that time five new applications have been approved by the Regional Committee for action at the annual meeting, and eleven others are still pending. The annual meeting of the Regional Committee was held on May 13.

The work that has been accomplished by our state groups is increasing steadily. Almost without exception the work is being carried on by Academy members working in conjunction and as members of their state or county societies and as interested members in the Parent-Teachers' Association, Public Health Association's state and city health departments, and private organizations.

In this way it has been possible to achieve results through organized medicine far greater than any that could have been accomplished had we tried to set up new organizations. In Indiana, the State Chairman is a member of the Indiana Health Council and Chairman of Child Health. In Iowa, our Chairman is a member of the Committee on Child Health and Protection of the State Medical Society. In Illinois, they are working in close cooperation with the State Society. In Ohio, the Chairman is on a State Committee of Preventive Medicine. The same is true in Minnesota, Wisconsin and Michigan. In Missouri, there has been a complete collapse of the state program for child welfare. Here the committee is interested in reinstating the work.

In most of the states the following definite lines of work are under way:

1. The education of the laity through speakers' bureaus usually fostered by the State Society, the talks on child welfare given by pediatricians.

2. Pediatric demonstration and educational programs for physicians sponsored by the State Society or university, or as in Illinois, by the Academy.

3. The development of an immunization campaign supervised by the health department and carried out by the practitioners as a powerful effort to interest men in general practice in preventive medicine.

4. The successful setting aside of one session of the State Society meeting for a pediatric program has been accomplished in Iowa, Minnesota, and Illinois.

5. The review of all material issued by the State Bureau of Maternal and Child Hygiene is carried on by the Iowa State Committee.

From the response for suggestions from the State Chairmen for furtherance of both the state as well as the national work, I have picked out the following as showing the trend of opinion: the holding of our annual meeting at other times than the American Medical Association meeting, possibly with other organizations interested in the child holding annual meetings; the greater interest of the Academy in the social-medical programs; a section in the Journal devoted to the various contiguous fields of child welfare.

In conclusion it seems that as individuals and as members of our state groups, the more we can work through and interest ourselves in all organizations that have to do with child health and care, the greater will be the accomplishment of the Academy. In a national way, the Academy must pick up those contacts with national organizations that we are making locally. A national meeting every second or third year of organizations interested in the child would bring together a group that could learn much, one from the other.

Respectfully submitted,

HENRY F. HELMHOLZ,
Regional Chairman.

Report of Region IV

The American Academy of Pediatrics in Region IV has had an active and satisfactory year. Eight new members have been elected, and five applications are awaiting action.

A Regional meeting was held in Los Angeles during November with 125 members and guests in attendance. An excellent two-day program of papers and demonstration of cases was presented. One session was given to a demonstration and discussion of the Child Guidance and Mental Hygiene work. Dr. Grulee, Secretary of the Academy, attended the meeting.

A local chapter of the Academy has been organized in San Francisco with Dr. Langley Porter, Dean of the Medical School of the University of California, as Chairman; Dr. Randolph G. Flood, Vice Chairman, and Dr. M. L. Cohn, Secretary. The chapter has actively cooperated with and advised the Health Department on school and child health work and communicable disease prophylaxis. The chapter undertook the preschool round-up and examined the children who are to enter school next year. This chapter is recognized as the official Pediatric Society of San Francisco.

In Idaho, the State Chairman, Dr. Harmon Tremaine, acting as representative of the State Medical Association, last year planned and carried out a state-wide child health week program. In January of this year with the support of the Medical Society, the Children's Bureau and the State Department of Public Welfare have launched a public health nursing program for children of the state. Under his guidance as Medical Director, this work is going forward. Twenty local child-health units have been organized for the handling of all health problems. With the help of CWA funds, fifty-eight field nurses were given training as public health workers and distributed through the state to initiate the work. Material has been obtained for a two-year campaign on vaccination and toxoid administration. At present there are four nursing directors, each with a territory larger than Massachusetts under her charge, and twenty field nurses for the forty-four counties. As there is no regular Board of Health in Idaho, this work, in charge of a pediatrician, is laying the foundation for State Public Health Work and is carrying on the functions of a Department of Health.

In Washington with the assistance of the State Department of Health, pediatricians are visiting the county medical societies. In each county a program with talks on pediatric problems, prophylaxis of communicable disease, and demonstrations of examination of infants and children is given.

Much of the work which comes under the scope of the Academy is being carried on by various members under the auspices of other organizations. The Academy on the Pacific Coast is a live and going organization.

Respectfully submitted,

JAY I. DURAND,
Regional Chairman.

Report of Region V

An increased interest is being shown by the Canadian pediatricians in the American Academy of Pediatrics. Owing to the geographic distribution of the Canadian population, however, it is possible that the best interest of the American Academy of Pediatrics and the Canadian pediatricians might be served by changing Region V, which includes all of Canada, so that the British Columbia pediatricians would be included in Region IV, the middle west pediatricians with Region III, and the eastern pediatricians, in Ontario and Quebec, with Region I. This suggestion is under consideration at the present time.

Respectfully submitted,

FREDERICK F. TISDALL,
Regional Chairman.

Report of the Committee on Clinical Investigation and Scientific Research

Since the last meeting the Committee has lost the very valuable service of Dr. Alfred F. Hess and feels that in his death the Society has had an irreparable loss.

Two matters have come to the attention of the Committee. First, the question of scarlet fever immunization and the advertisement which Parke Davis & Company has been said to have put in the *Parents' Magazine* and the *Journal of the American Medical Association*. The Committee has considered this point and feels that it is a matter which comes under the Committee on Drugs of the American Medical Association. The whole matter of scarlet fever immunization, both by the toxin and by the toxoid methods, is being investigated in various clinics and by the U. S. Public Health Service and the Massachusetts State Board of Health. The results of these investigations must be awaited before it is possible to evaluate their usefulness.

The second matter which has been brought up is the question of having an index made of the first forty volumes of the *American Journal of Diseases of Children*. It is the consensus of opinion of your Committee that whereas such an index would be valuable, with the present economic state it would not be justified in spending that money in work which would duplicate the work of the *Cumulative Index*.

Respectfully submitted,

FRITZ B. TALBOT,
Chairman.

Report of the Committee on Hospitals and Dispensaries

During the past year the Committee has completed its report on the children's hospitals of the country and has published it in serial form in the JOURNAL OF PEDIATRICS and the *Bulletin of the American Hospital Association*. It seems wise to the Committee to add to this report a supplementary report on three children's hospitals, namely, Baylor Hospital, Dallas, Texas; Doernbrecher Hospital, Portland, Oregon; and St. Christopher's Children's Hospital, Philadelphia.

We have almost completed a questionnaire survey of all the general hospitals having twenty-five or more beds for children and in the near future this report will be ready for publication.

It is hoped to make a survey from these reports of the positions for internes and residents in the various hospitals of the country. We hope to make, in the next year, a survey of the hospitals for communicable diseases.

Respectfully submitted,

CLIFFORD G. GRULEE,
Chairman.

Report of Committee on Medical Education

The recommendations of the Committee which were adopted at the last meeting of the Academy in regard to the formation of a board for the certification of pediatricians were presented to the American Pediatric Society and the Section on Pediatries of the American Medical Association at their 1933 meetings and were adopted by each.

As a result three members were appointed to form this board from each of the three societies, and, as has been announced in the pediatric journals, the American Board of Pediatries has been formed and incorporated. This Board has been accepted as a member of the Advisory Board on Medical Specialties. Application blanks, with a booklet of information, have been sent to each member of the Academy. In 1935 the term of one member of the Board nominated by the Academy will automatically expire and a new appointment must be made by the Academy.

The American Board of Pediatrics has taken the attitude that it is the agent of the three national societies, or means by which the three societies are attempting to raise and control the standards of pediatries as a specialized form of practice, and therefore the work of the Board is the responsibility of the societies.

The Academy Committee on Medical Education agrees with this viewpoint as the Board is controlled by the three societies. As it reported to the Academy last year, the Committee concluded, after a thorough study of the question of specialization which it was directed to make at the Academy meeting in 1932, that the formation of a board of certification whose membership was controlled by the national pediatric societies, but whose work was independent, offered the best solution for the complicated situation of specialization which exists in the United States. Such a board has now been formed and the Academy should give it whole-hearted support.

No further studies have been made by the Committee. Improvement in character and the scope of undergraduate pediatric teaching has taken place in several medical schools in the past year. It is planned to make a check in 1935—five years after the last check.

The Committee feels that one of the important steps in education is improvement in the character and type of work given internes and residents in the various hospitals for children. This is the chief method used for the preparation of men for a specialization, and it is obvious that hospital chiefs have an important duty and obligation.

Although pediatrics is recognized in all but four of the Medical Schools as one of the four basic fields of clinical medicine and definite and distinct departments are maintained of equal rank with those of medicine, surgery and obstetrics, a similar recognition has not been given pediatrics by many of the boards of licensure. Three years ago the National Board of Examiners added a pediatrician to their board but as yet has not recognized the need of a separate examination in pediatrics. The Committee feels that such an examination should be given, as it brings the general plan and scope of examinations in harmony with the plan and scope of medical education. The Committee, therefore, offers the following resolution:

"WHEREAS, the subject of pediatrics is regarded in over 90 per cent of the American Medical Schools as one of the four basic clinical subjects, and not as a specialty, and separate departments exist in these schools of equal rank and independence as the departments of medicine, surgery and obstetrics, be it

"*Resolved*, That the National Board of Medical Examiners be requested to take immediate action to add to their list of examinations a separate examination in Pediatrics, giving it equal rank and importance with the other major subjects in medicine."

Respectfully submitted,
BORDEN S. VEEDER,
Chairman, Committee on Medical Education.

Report of the Committee on Relation of the Academy to Philanthropic Agencies, Welfare Workers, Public Health Agencies, etc.

The Committee on Relation of the Academy to Philanthropic Agencies, Welfare Workers, Public Health Agencies, etc., has been reorganized during the past winter and will hold its first meeting in Cleveland in June. At that time the function of the Committee will be discussed and plans outlined as to the scope of its work for next year.

The membership of the Committee is as follows:

Dr. Philip F. Barbour, Louisville, Ky.
Dr. W. L. Crawford, Rockford, Ill.
Dr. Stanley H. Nichols, Asbury Park, N. J.
Dr. Oscar Reiss, Los Angeles, Calif.
Dr. Martha M. Eliot, Chairman, New Haven, Conn.

During the winter the question of whether the Academy would be willing to request the Federal Emergency Relief Administration to authorize the payment of fees for health examination of children on relief was referred to this Committee. On March 6, 1934, the following resolution that had been unanimously adopted by the Committee was sent to the Board of the Academy for its consideration:

"In view of the present widespread effort to safeguard the health and nutritional status of children in the face of current adverse economic conditions and in consideration of the need of careful medical examinations in the evaluation of health and nutritional status before reasonably satisfactory opinion can be given as to the necessary medical and dietary care, the Committee on the Relation of the Academy to Philanthropic Agencies recommends that a letter be addressed to Mr. Harry L. Hopkins, Federal Emergency Relief Administrator, by the Executive Board of the Academy endorsing the recommendation of the Executive Committee of the Child Health Recovery Conference with regard to the payment of a fee for child health examinations and urging him to reconsider the question of the payment of such a fee for the examination of children in families on relief lists with a view to finding those children that are undernourished and those in need of immediate medical attention. It is our understanding that necessary medical care of families on relief can be paid for under F.E.R.A. Rule No. 7, 'Governing Medical Care Provided in the Home to Recipients of Unemployment Relief,' in those states that have adopted a plan for such medical care. There are today throughout the country many children who are suffering from lack of adequate food or from lack of proper medical care, not only children in families on relief, but also children in families who, though not on relief, are nevertheless in need because of unemployment. For the Federal Emergency Relief Administration to authorize the payment of a fee for health examinations of children in families on relief would add stimulus to the whole program to safeguard the health of children in the present economic crisis. It is, of course, recognized that certain regulations with regard to standards of examination, etc., would have to be worked out by the Relief Administration. The American Academy of Pediatrics would stand ready to assist in any way possible."

The resolution was supported by unanimous action of the Board and a copy sent to Mr. Harry L. Hopkins, Federal Relief Administrator, on April 9, 1934.

No further action has been reported.

There has recently come to the attention of this committee the question of whether the Academy wishes to approve the production of a motion picture on Postpartum Care and the Home Management of the Newborn to be produced by an industrial studio and financed by a commercial firm. This matter will be considered at the meeting of the committee in June.

Respectfully submitted,
MARTHA M. ELIOT,
Chairman.

Report of the Chairman of the Committee on School Health and School Health Education

(Presented in Lieu of a Committee Report to the American Academy of Pediatricians at Its Fourth Annual Meeting in Cleveland Held on June 11 and 12.)

The attached report consists of a brief outline submitted to the Committee as a basis for criticisms and suggestions out of which the Committee Report could be formulated.

The Chairman presents his apologies for not having been able to prepare a Committee Report for presentation at this time, but assures the members of the Academy that if the Committee is continued, a report will be presented at the next annual meeting.

This brief outline is presented by the Chairman as an evidence of good faith and in its present form can be regarded only as a promise of greater effort in the coming year rather than as a Committee Report.

Respectfully submitted,
LEROY A. WILKES,
Chairman.

TENTATIVE OUTLINE OF STUDY PROPOSED

School Medical Inspection

Scope of Study.—This study is definitely limited in its scope for next year to the determination of medical opinion as to (a) what is and (b) what should be the (1) purpose, (2) methods suggested, (3) criteria for judging the results obtained, (4) plan for coordination of medical services with other services available in the community and in the home, and (5) agencies directing such work.

Procedure.—This information will be gathered in part by specific questions to be presented for answers and comments to (a) physicians experienced in public and private school medical services, (b) pediatricians, (c) family physicians, (d) physicians who specialize as public health department administrators in different states and cities of various size (population) and nationality predominance.

The Committee members will cover by visits and letters, assigned areas of the country and learn as much as possible about the physical characteristic diets, interests, prejudices, and preferences of the races predominating in the areas assigned, that is, Negroes, Latins, Nordics, and Asiatics.

Study to Be Intensive.—The study aims to be intensive rather than extensive, and will deal chiefly with the practical problems faced. An attempt will be made by the committee to develop a guiding philosophy to serve first as a target for criticisms and suggestions in order to determine points of medical professional agreement and disagreement. A philosophy which will be approved and accepted by medical leaders must be developed. Much of the philosophy underlying the procedure

now in vogue in schools has not been developed by the organized medical societies, but by educational administrators or lay boards of education or health.

It is believed that the most useful purpose will be served by ignoring, at this time, the philosophy, aims and procedure of the school administrators, educators, social workers and nonmedical health workers of various types as they influence the present-day medical inspection programs.

Later Expansion of Scope of Study Is Contemplated.—When this study has reached a certain stage of development within the medical profession, it will be presented for criticism to outstanding educational administrators and community fund directors; to business executives who have shown distinct civic interest; to selected public officials, such as mayors, city commissioners, city managers, community chest directors, responsible for the allocation of tax money; to legal authorities and to independent civic groups of men and women; most of whom will, in addition to their special interests, also represent the parents.

Historical Synopsis.—A brief review of the stages through which school health work has passed since its inception will be prepared. This should aid the Committee and others in a better understanding of the changes in purpose and procedure which have marked the growth and development of health work in the schools and the reasons therefor and may explain the large increase in personnel engaged in carrying on the programs at various times and in certain places in this country.

Suggestions for Improvement.—Finally this Committee should offer as a result of this study some very concrete suggestions as to what should constitute a school health program—its aims and objectives—leaving the methods to be suited to the local needs when approved by the Medical Society, the school authorities, and a representative organization of the parents.

Changes in the Constitution and By-Laws were adopted.

Applicants as presented by the Executive Board were approved for membership.

The following resolution was adopted at the open meeting on recommendation of the Committee on Medical Education:

"WHEREAS, the subject of pediatrics is regarded in over ninety per cent of the American Medical Schools as one of the four basic clinical subjects and not as a specialty, and separate departments exist in these schools of equal rank and independence as the departments of medicine, surgery, and obstetrics; be it

"*Resolved*, That the National Board of Examiners be requested to take immediate action to add to their list of examinations a separate examination in pediatrics, giving it equal rank and importance with the other major subjects in medicine."

Dr. Henry Helmholz was appointed a committee of one to investigate the advisability of meeting with other societies interested in the child.

The Nominating Committee recommended the following: for Vice President (President-Elect), Dr. Henry Dietrich of Los Angeles and for Regional Chairman of Region IV, Dr. Edward B. Shaw of San Francisco. These were elected to their respective offices.

President-Elect Cooley.—I cannot possibly hope to grace this office as have my distinguished predecessors, Abt, Morse, Hamill, and Ruhräh. There are few of us who can hope to measure up to them in grace and dignity and accomplishment. The most I can do is to promise to try to keep the Academy in the course which has led it so far and so well and to remind you that this is your Academy, not mine, or any other officer's. We have watched it, tried to help it develop as the real expression of pediatrics in this country, and we feel that it is taking that position, that it has come to be the mouthpiece of American Pediatrics, and that it is on its way to benefit our mutual profession and specialty and to make it a better one.

It has been and will be, so far as its real work is concerned, largely in the hands of committees. The individual members will work in their different sections and regions as part of the regional organization, and the general committees will carry on the work of national scope. These meetings, pleasant as they are, and much as we enjoy them, are not the things which, on the whole, are going to represent the main work of the Academy, but it is your Academy, and in the regional meetings and meetings like this, those of us who are entrusted with the guidance of the Academy want to know what you want your Academy to do and to do our best to see that you get it.

I think we are all pretty well satisfied with what the Academy has done and the route it has taken during its four years of life, that we can feel we are really off to a good start.

I had thought to say some other things which I don't believe I need to say as to some of the purposes of the Academy, as to what we are spending your money for, what you are getting for it, but I think from what I gather of the temper of this meeting you are pretty well satisfied yourselves, so we don't need to try to go further. I believe we can leave it with the promise that we are going to try to keep on doing our best, and I thank you from the bottom of my heart.

A vote of thanks was given to the Wade Park Manor Hotel and the Cleveland Medical Library for their cooperation.

The meeting adjourned.

THIRD ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

MONDAY AFTERNOON SESSION

JUNE 13, 1933

Round Table Discussion on Attitudes of and Toward Children

Leader: Dr. Bert I. Beverly.

The meeting was called to order at two o'clock in Room 194A of the Edgewater Beach Hotel, by the Chairman, Dr. Bert Beverly, Chicago, Ill.

DR. BEVERLY.—This is a round table discussion on behavior problems in children. We have taken three phases of the subject for consideration: first, the general attitude of parents toward children; second, the attitude of schools toward children; third, the normal attitude of children themselves.

Attitudes of Parents

Bert I. Beverly, Chicago, Ill.

Children born with potentialities for development and growing more or less according to fixed patterns react to their particular environment, and the product is behavior. Of the environmental influences, the attitude of parents is most important. In order to understand the behavior of children, it is necessary to have some conception of the normal and distorted attitudes of parents.

The rearing of children is, to a large extent, on an instinctive basis. Their protection is a part of that process. Parents are frightened for fear something will happen to their children. The effect of this fear in parents is known to all of us when our own children get sick. Today, when the danger of rearing children is the least in history, parents are the most frightened in history. This is due to many factors, the most important being the endless propaganda which has been carried on by the large number of organizations interested in children during the past twenty-five years. Information often superficial in character or incomplete and carrying with it a threat for the welfare of the child has been widely disseminated and greatly increased the normal apprehension of parents. The sense of guilt which still prevails in the minds of the greater part of the populace regarding birth control and the fact that parents have but one or two children increases their anxiety.

The normal attitude of each parent is significant. When a woman has a baby, she reaches next to the most powerful period in her existence (the most powerful period being during her own infancy). The life, care, and very existence of the baby is dependent upon her. She is elevated to an egocentric position, which is naturally enjoyable. As the child grows and should be caring for himself, mother's relative importance rapidly decreases. She does everything in her power to keep from giving up this dependence of the child. All mothers hate to see their babies grow up, and the selfish mother will not permit it. From time immemorial father has been the disciplinarian. To insult a father one has but to tell him he does not know how to discipline children. His method of discipline is, of course, force and fear. As a result of these attachments to mother and the position of father in the family, all children are afraid of father, and most of them do not lose their dependence on mother.

The individual attitude of parents is important. When seeing a behavior problem child, I always ask myself two questions: First, what do the parents see in this child that is not there? Second, what are they trying to develop in the child that is unimportant? These attitudes may be clarified by illustrations. A mother brought a child for examination because of stammering. He began stammering a couple of months after they moved into a new home. At that time the mother decided she could now rear her child as he should be reared. The boy had two characteristics which she greatly disliked. Those were the two characteristics of her husband which were annoying. Her husband was very argumentative and did not show the proper respect, even to his own mother. When this intelligent, conscientious mother called her child to lunch, he asked why he could not finish the game he was playing. That was the argumentation coming out. When he had finished lunch he refused to say, "Thank you, Mom," etc. That was the lack of respect. Accordingly the mother proceeded to whip and punish those two characteristics out of her child. At the end of a few weeks he was stammering so he could not be understood. When she changed her methods, the stammering disappeared entirely. Parents almost always describe behavior problem children as "different." When you ask how long they have been different, they usually say, "Since birth." A mother who brought a child for examination because of stealing recalled that her own mother pointed out when the patient was an infant how much he resembled Uncle John. Uncle John was in the penitentiary. The father of this child boasted about the severe beating he gave the boy when he was three years old because he brought a toy home from a neighbor's—this being interpreted as stealing. In other words, we see two parents knocking Uncle John out of the child from the time he was born. The result is an extreme behavior problem. It is interesting to ask parents what they consider the most important characteristics to develop in their children. One father insists that order is most important and complains that he cannot force his little six-year-old savage to be orderly. Another father, an insignificant individual with obvious extreme inferiority feelings, never had an opportunity to show his authority in the world until he had children of his own. To him obedience is the one thing to teach children. A woman with a cleanliness complex, of course, is concerned about that. Another parent is concerned over respect, manners, etc. It is important to recognize that no two agree on the important characteristics, indicating, of course, that none of them are very important. From our standpoint, the important thing to recognize is that parents use their children as an outlet for their own personality difficulties. They see in their children their own fears and want to develop in their children their own peculiarities and idiosyncrasies.

DR. BEVERLY.—The next presentation will be on the attitude of schools toward children. We are fortunate in having for this presentation an outstanding expert on school affairs, Dr. W. E. Blatz.

The Attitudes of Schools Toward Children

W. E. Blatz, Toronto, Ontario

Instead of talking directly on the schools, I would like to put forth a theory that we have been developing in Toronto on the fundamental attitudes of children, and then later on show some of its applications to school life.

The word "attitude" is used very loosely, especially in psychology. We have confined the word "attitude" to a specific performance on the part of the child and its counterpart in adult life.

There are the tastes which we all have. Some of us like cucumbers; some of us like strawberries. Some of us like red neckties, and others like blue neckties; still

others like brown. Some of us like jazz, and some of us like dancing, and so forth. These tastes have very commonly been thought of as hereditary. We talk about infants being "to the manner born."

I am going to try to demonstrate today that this is untrue; an infant can be born into cultured society and develop cultured tastes, because its surroundings are such, but it is also true that a child can be born into an uncultured environment but later moving into cultured society can develop just as many cultured tastes as the child originally born into cultured society.

If we study the newborn infant we find already there are preformed behavior patterns of two kinds, namely, one of approach and one of withdrawal, or positive and negative.

These approach and withdrawal responses, which are definitely motor, exist in connection with the perceptual experience of the child, the sensory experience. Every child, if you put a bitter substance in its mouth, may attempt to reject or withdraw from it. If it is a sweet substance, the child may accept it or reject it, as the case may be. In the same way, the child may accept or reject comfort and pain, and so forth.

You may call that trait instinctive, if you like. The whole development of taste begins and continues on through life, and I have an idea that, perhaps, the greatest difference in our personalities, the thing that makes us all so different is the different situations through which we live and by which we acquire a group of tastes or likes and dislikes.

This may not be very startling, but if we examine its potentialities, it means this; when we talk about an individual liking or disliking a thing, we are really putting the cart before the horse, because an individual does not eat strawberries because he likes them, but he likes strawberries because he eats them. He does not reject cucumbers because he dislikes them, but he dislikes them because he rejects them.

Let me give an illustration of how that works. If we were to take a nine-year-old boy and place before him a huge strawberry shortcake, we will assume that at this time this indiivdual likes strawberry shortcake. How do we know? Because if we cut this into the traditional sections and say to the child (in the absence of the pediatrician and the nurse, naturally), "Go ahead and eat all you like," he will take the first piece of strawberry shortcake, and you can tell by the evident manifestation of his approach attitude that this individual is enjoying the situation.

Then we give him another piece and another piece and another. We will assume it is the same strawberry shortcake. We can tell by the change in his performance that his attitude toward strawberry shortcake is changing, and if we keep on we will find ultimately the child will eat so much that he will vomit. Vomiting is the extreme form of rejection. At that time, if you say to him, "Do you want any more strawberry shortcake?" he will say, "No." He will manifest that rejection.

Here is a situation in which the attitude of that boy has changed from one of extreme approach to one of extreme rejection.

Most of our rejections and approaches have been based on exactly that point. He carries over the sense of something unpleasant or rejected. If you give him castor oil at night and the next morning for breakfast present him with strawberry shortcake, his attitude toward it will still be one of withdrawal or objection.

You can see if we get away from purely sensory psychology—it is not toward the individual sensations, the taste of the strawberries and the sweetness of the cream—each part of it individually contributes toward the whole.

We will leave that and turn to another term we have found very useful. When we examine the first five years of childhood, we find one of the most important things is the development of physiologic habits, and we find we can divide these physiological trends or aspects, into six divisions. They are hunger, thirst, elimination, rest, change, and sex. These six are, as far as we know, all of the physiologic habits that are present in the first five years, or for the rest of our lives. As a matter of fact, the importance of that early five years is that we develop our attitudes toward these six quite definitely. From then on we very seldom change our attitude except by a definite form of education.

I think, perhaps, the psychologist can be blamed for being too much interested in self-expression. On the other hand, I think that the physician—I am not considering this group, of course, because the Chairman has already told you they are the outstanding group, and certainly those not here are not sufficiently interested in the development of the individual—is far too interested in the development of the social attitudes in general.

An appetite might be defined as a physiologic mechanism, more or less circumscribed, present in all individuals, with a definite sensory experience manifesting a rhythmic or cyclic form of performance for which there is an instinctive response at birth, which must be modified by some form of education.

Let me illustrate that in terms of hunger. Hunger can be described in terms of physiology more or less definitely as the mechanism of accepting food, of getting it into the intestinal tract, taking from it what we consider to be worthy, and passing it on then to be excreted.

The sensory experience was commonly thought to be as pure a sensation, for instance, as the color red in vision, but we know now that is not true. Hunger is a far more complicated thing than the color red. It pertains of appetite, but far more important is the feeling we get, after we have eaten, partly kinesthetic, in the form of distention, of repletion, the feeling you get with the change of the blood supply from one part of the body to another, in order to carry on digestion. We seem to feel when we are hungry. None of us need to know the least bit about the physiologic mechanism of digestion to know when we are hungry and when we are not.

The cyclic manifestation of this appetite of hunger is interesting, because after the individual is born, we assume he is hungry because he looks as if he is hungry, and in a certain period after birth we feed that individual. There is no other way of knowing. We can't ask the child if he is hungry, so we feed him, and thus fulfill the environmental situation in such a way that he can respond instinctively. There is a period of rest, then a gradual period when hunger manifests itself. He is fed again; the food goes down the intestinal tract in the normal manner, and the child rests, and that cycle goes on from the time the child is born until he dies.

We learn, those of us who have been trained in mechanistic philosophy, that this depends on definite physiologic mechanisms, but it does not. I don't suppose any one here would say that four hours is the exact time you should wait before you feed a normal, healthy child again. No one would say that six, ten, two, six, and eleven, and leave one out, is the normal periodicity exactly of the human stomach. If we had no watches and no clocks that time would not be the same. As soon as the child shows some signs of being a little underfed, we change it at will.

In other words, it is not physiology but psychology, that determines when the child is going to be fed. Just because we say four hours does not necessarily mean that three hours, forty minutes and twenty seconds would not be a better time period, but four hours happens to be one, that is arbitrarily determined.

When we get into adult life, we change it to three times a day. In England it is four times a day; in Germany it is five times a day; and sometimes, in relief, it is whenever you can get it.

At any rate, there is no definite physiologic or mechanistic rule by which you should say children should be fed at these various times. By training you can change the physiologic background of the individual, because, strangely enough, if for the first two weeks of life this child is fed at four-hour intervals, he is hungry every four hours. We have made that child hungry, so that he expects food at that time. That is why we are hungry morning, noon and night, not because of any physiologic need, but because of our social background. The response to this feeling and physiologic demand is chewing, later swallowing, then the peristalsis of the esophagus, the opening of the various valves, the peristalsis of the stomach, the action of the glands, and so forth.

We are interested wholly in the fact that here is a child with a mechanism already determined to satisfy this specific appetite. This response would remain unmodified throughout life, but for the fact that there must be a great deal of modification in order that this individual may be a social individual. This modification is of three kinds. First, there is the modification due to growth and maturity. At six months with the onset of teeth, the child chews where prior to that he only sucked. There is also the change in the glandular secretions, the change in the size of the stomach, the increase in the solid particles of food, and so forth.

But I am interested in the next two modifications. They are the individual satisfaction of the child, and second, the social requirements. Notice what happens in the individual satisfaction of the child. You make up a formula for a child, and you are very much interested in the interrelationships of the carbohydrates, fats, proteins, vitamins, salts, and so forth. After all, you can make up as scientific a formula as you like, but as far as the child is concerned he does not derive much benefit from that formula unless the milk is put into the stomach.

As soon as you begin to think of putting it into the stomach you have to ask for the cooperation of the child and in order to do that you must not only think of the carbohydrates, fats, and proteins, but you must think of the child's enjoying the food in such a way that he will not be upset.

You are all familiar with Cameron's work on the influence of the emotions on digestion. Every time a feeding arrangement or period is accompanied by emotion, no matter how scientific the formula, that child is disturbed and digestion is disturbed.

Then we begin to investigate. What are the things that we must look into when a child is eating? We tend to pay a great deal of attention to the taste of the food. What I would like to put before you here today is that eating is, perhaps, from the sensory point of view, the most complicated of all of the six that I have mentioned.

You go to a symphony concert; with much ingenuity, the composer has taken the range of auditory sensations and put them into definite juxtaposition, so that we may or may not enjoy that, depending upon our training; however; there is very little other than audition concerned—perhaps the sight of the violin bows going up and down, but really very little, because we enjoy it over the radio, too.

But when we come to eating, we find that taste and the consistency of food, which is kinesthesis, are very important in infancy. As the child grows up, we find there is added the temperature. We have vision, the sight of the food. We have kinesthesia, with the onset of teeth, and we have found, too, there is sound, for instance, with celery, or soup, if that is the way you eat it. We have the flavors, which later on are very important, but are not very important in infancy.

Now you see, if we could only have some artistic individual who would take all of these sensory experiences, there would be much more opportunity for the development of a symphony at every meal than there has been in any opera house that has ever been built.

This is all ignored in the training of children. The appurtenances of feeding time have been covered up, or disregarded because of the emphasis put on the scientific preparation of foods and the scientific preparation of the formula.

The question of forcing was mentioned and under the scheme I am putting forth here, forcing is absolutely ruled out. If it has to be done, it must be done in such a way that the individual knows it is being forced, namely, by the stomach tube. I can remember an experience I had with reference to that. An individual was told his three-year-old child would die if he did not get protein milk. You probably have all tried protein milk and you know it is not very palatable. He tried it out, but the child immediately rejected it. For four days this father at breakfast had to spank the child, who then took the protein milk. He had to come home from work at noon and spank the child again to get him to take the protein milk, and again in the evening the same performance was repeated.

He called me up on the fifth day and asked, "What am I going to do? This business of spanking is going to create another rather serious problem if I keep it up."

So I told him, "Well, do the best you can. My plan would be that you use a stomach tube."

The next noon he went in and said to the child, "If you don't eat this protein milk I am going to use this stomach tube."

The child immediately ate the protein milk. I cite that as not what you should do, but simply as an illustration of a principle, that the only time one can force an individual to eat is when it is a case of life and death, and then the forcing should not be done by holding the hands, by holding the jaw, or by holding the nose, but by going through a performance such as using any kind of apparatus for getting the food into the stomach, and doing it until the question of life and death has disappeared, then leaving the child to his own resources.

As far as the social aspect of appetite is concerned, you will all agree that this, too, is overemphasized. We know from our experiments, and you know, too, there are various stages at which the child can enter into the social participation with reference to appetite. At the age of about eight or ten months he can start drinking out of a glass. The time with different individuals varies, of course. At the age of two a child should be able to feed himself, without any help at all, and should be able to use a spoon. At the age of three he should be able to use a fork. At the age of five he should be able to use a fork and knife.

By the age of five you can begin to introduce the very arbitrary rules and regulations. Prior to that they mean very little, and the insistence on "Please" and "Thank you," the insistence on a clean doily, clean this, and clean that, is, of course, expecting the child to do too much.

A family that rather prides itself on culture will always object very strenuously to a child of four who wishes to eat his soup with audible enjoyment. Trying to insist then that the child should conform to a social standard which is purely adult will lead to more of the problems that arise in feeding. From five on, one can begin to insist on these social things; then, depending upon the family, they can use four forks and four knives, where only one or two were used before.

I want to emphasize here how much time the average parent spends on teaching the child how to eat. If we were to add this all up, as they do in medical school,

where you get seventy-six hours of bacteriology, and so many hours of something else, you'd find that the child probably spends two years of his life being taught how to eat.

If we take up the other five appetites, we find that there are very few children at the age of three who can go through the night without being awakened and without wetting the bed. Ninety-five per cent of the children who wet the bed after three years of age are purely training problems.

With reference to the appetite of thirst, we don't do much about that, and it requires very little training. If you disturb the fluid intake, the individual is going to be seriously harmed.

The appetite of change leads later on to the use of leisure and recreation. Adolescent problems are rather serious and arise from the fact that we don't teach our children how to use their leisure. Probably one of the most serious problems in this depression is the use of leisure.

The appetite for rest and sleep is another thing we have not enough time to go into, but I want to say a few words about the appetite of sex, which problem comes up in school. It starts in at about the ninth year with the passing of pornographic notes, and continues into adolescence.

I mentioned the fact that parents are very much interested and very emphatic that their children behave well at the table, and yet, when we investigate this appetite of sex, which has, all of the aspects I have mentioned in hunger, the physiologic background, the sensory experience, the rhythmic or cyclic character, which lays upon it the requirement to modify it, there is very little education undertaken. I was very much interested three months ago to see the Anglican Church was having prepared a pamphlet on sex to be given to brides and bridegrooms when they come to the altar, about ten years too late.

To whom are adolescents to look? The first person they look to is the physician, and I have still to find that there is a greater knowledge of sex education among physicians than among the general public. They know all the physiology or most of it in a scientific way, but as far as the sociology is concerned they know very little. Then they turn toward the ministers. You know how much the physicians get from them. Finally they turn to their grandmothers, and we have the results of that in our present-day behavior problems.

This leads me to the final point that has to do with schools. Specifically, what do we call a problem? And if you think for a moment you will see that a problem is a form of behavior of which we, as individuals, disapprove.

I am going to define a problem in a different way. So far as we, as a social group, are responsible, not only to see that the individual enjoys his hunger and his thirst and his elimination—and I may say that one form of constipation in adults is the shame that we apply to that in the early five years, that they no longer enjoy elimination—and his rest and enjoys change or leisure and enjoys sex which, as you can see from the attitude developed in the average home, is looked upon as something which should never be enjoyed, and if so, it should be enjoyed surreptitiously, we are then responsible for seeing that individuals enjoy their physiologic functions.

On the other hand, we are responsible for their learning early how to adjust to the social conventions that are necessary only if they are going to accede to them.

I look upon these problems as mistakes in education. I look upon stealing, lying, masturbation, bad temper, and so forth, as mistakes in the learning process, just as an individual makes a mistake in spelling. They used to strap us for a mistake in spelling in school. Now we realize that a mistake in spelling may be due to bad teaching. We never expect an individual to go through school never having made a mistake in spelling. That would be a very unusual kind of development.

If we look upon these as mistakes the first thing we ask is, can it possibly be a mistake in education? We who are parents, educators, and physicians will first ask, perhaps, am I responsible for this mistake? We will look into the situation in such a way that the environment rather than the individual will be the thing we will look after. In so far as we expect children to make mistakes in spelling, so we will expect every child to steal and every child to lie and every child to masturbate and every child to lose his temper, and we can only hope that if we look at this as an educational problem we will arrive at a generation of adults who will have become so mature that they will have accomplished all these mistakes at a time when it does not count, and that we then as adults and they as adults will no longer manifest by this behavior the peculiar idiosyncracies of juvenile mistakes.

CHAIRMAN BEVERLY.—To me, the worst thing about a child's stealing is that he is caught. If he is not caught, it is all right. It is a strange thing that we seldom recognize what is normal in children. We are so busy seeing them through the eyes of adults and through the eyes of organized society.

The next presentation will be on "Attitudes of Children" by Dr. Arthur Parmelee.

The Attitudes of Children

A. H. Parmelee, Chicago, Ill.

The practice of pediatrics is a very complicated job. A fairly comprehensive knowledge of infant feeding, basic principles of nutrition and growth, the peculiarities of the newborn period, the diseases that affect infants and children exclusively, and the peculiarities of the clinical response of infants and children to other diseases, we knew would be expected of us, but when we actually got into the practice of our specialty we found that there were many other phases of child care to be handled. What kind of diaper material is best, what kind of shirts and petticoats, how wide should the window be opened in the winter time, how long do you want the carrots cooked, etc. Our resourcefulness was taxed to the limit by such questions. With some help from home and with some native intelligence vulgarly known as "common sense" we got along fairly well. But when Mrs. A. asked what to do when her boy held his breath or stamped his feet and had a tantrum, and Mrs. B. could not get her four-year-old girl to eat without feeding her and telling stories or singing songs, and Mrs. C. complained of her child's disposition and disobedience, and Mrs. X. said her boy was wetting the bed since he had pneumonia though he'd not been doing that for two years, we were really up against it. We didn't know the answer and, of course, didn't know how to treat the patient. We looked for help and found that there were psychologists, educators, and psychiatrists studying these problems. Now we are learning from them and rounding out our knowledge in a way that makes us better able to give practical aid in this part of our job.

The child's behavior is the result of his experience in the home, in the school, and in his contact with other people. A careful inquiry into the home conditions, the school conditions, and the rest of his environment is necessary in a study of the etiology of his attitudes, sometimes the answer is comparatively simple but often there are so many causative factors that the ingenuity of a detective is required.

It may be said that no two individuals even in the same family have the same environment. Then it follows that the conduct of each individual will be different, and we have as many varieties of attitudes as there are individuals. But there are certain types of conduct that are expressions of attitudes produced by more or less similar environmental conditions. The more common types will be briefly outlined for a basis of discussion.

The only child learns rather early that he is the object of much solicitous attention. He learns that he can obtain attention by certain actions. He enjoys such attention. One of the surest ways to get attention is to refuse food because, as Dr. Beverly has stated, most parents are strongly food conscious. Poor appetite has become our commonest problem. The child who for any reason wants attention usually uses this method among others.

R. G., an adopted child of middle-aged parents did well until he was old enough to eat at the table, then had to be fed everything he ate. Nothing could persuade the parents to do otherwise. The situation became serious when he was four years old. He was badly burned at that time, a physician came every day for several weeks and there was a nurse in attendance. After his recovery he was unhappy to see that he was no longer receiving the constant attention of every one in the house; he refused to eat and deliberately vomited when forced to eat. This worked so well he persisted in it until he had lost three pounds in weight. When put in a general children's ward in a hospital, he began after four days to eat normally whatever was offered and vomited no more.

The child enjoys his dominant position in the group and is reluctant to give it up. Other expressions of this attitude are numerous, e.g., refusing to go to sleep quietly at night, general disobedience, interrupting mother's or father's conversation with others, etc.

Jealousy may produce a variety of expressions in conduct.

Jeanette A., ten years old, was always well but never had a good appetite. She was the youngest of three until four months ago when a new baby arrived. Since that time her anorexia has been much worse and she complains frequently of stomach ache.

There are attitudes also that are due to unresponsiveness on the part of the parents.

Constance B., six years old, was the oldest of three. The complaint was that she was nervous, restless at school and in the home, and found difficulty in entering into the activities of other children in the neighborhood. The mother was an intelligent woman but had deliberately refrained from showing affection toward her children. She was unresponsive and gave very little outward evidence of interest in her children. After changing her attitude toward the children this girl's symptoms rapidly disappeared.

A sense of insecurity in the family group often gives rise to a group of symptoms dominated by unhappiness and irritability. This is apt to occur in larger families where children follow in rather rapid succession.

Karl A., four years old, was the fifth of seven children. He was born when his older brother was two years old and when the patient was one and one-half years old, a sister was born. He seems unhappy most of the time, acts annoyed and is restless, not contented to play with other children and will not play for any length of time by himself.

Here the mother was overworked and tired. She could not spend any time with him. He was simply being crowded out of the nest, and he was confused.

We are told by the school of psychoanalysis that there are two strong primitive drives in man, one is of aggressiveness and the other is the sex drive. Frustrations of either or both of these strong impulses in the child lead to a confusion of emotions. Certainly all kinds of fears arise in the mental experiences of children and their reactions to these fears take on many forms. Attitudes of bravado in which a child will be very boisterous and impudent, be a bully and be destructive simply to cover up his fears and his extreme sense of inferiority. On the other hand he may withdraw into lonely seclusion to avoid situations that would expose him to competition or would display him for comparison.

As practicing physicians we must also be aware that the child is extremely sensitive to our attitude, as well as his parents', toward his health. The child who is sick may suffer in his mental health as much or more from the effects of the physician's and parents' attitude as he does from the physical ailment. When confronted, for example, with the task of deciding how long a child with a mild rheumatic heart lesion should be kept in bed, or how much restriction should be put on the activity, I am often inclined to take a chance on the heart for the sake of avoiding the danger of permanently injuring the child's mental health by too long a period of invalidism. A sane attitude on the part of the physician and the parents in the sickroom may save a child from a lifetime of neuroticism.

Feelings of inferiority may have a real physical basis. Small stature, physical weakness, due to constitutional inferiority, disease, or poor nutrition, or to fatigue from various causes may frequently be an important contributing cause if not the chief factor in his difficulties of adjustment. And, as Dr. Richards has emphasized, the child's intellectual capacity and his temperamental and emotional heritage have a bearing on his possibilities of adjustment.

Children must be treated by parents and by physicians as individuals. Each has a certain degree of intelligence depending upon his age, his experiences, his hereditary and environmental background. Much more progress will be made when parents, teachers and physicians give children proper credit for the intelligence they have and stop treating them all like babies from infancy to puberty.

DR. BEVERLY.—We have with us an outstanding pediatric psychiatrist, Dr. George Mohr, to open the discussion.

DISCUSSION

GEORGE J. MOHR (PITTSBURGH, PA.).—We have had an unusual opportunity today in that we have been able to listen to Dr. Beverly, Dr. Parmelee, and Dr. Blatz, who discussed some problems of practical importance to all of us. Perhaps I might address my comments to a specific problem that everybody here is greatly interested in, namely, what should we reasonably expect to be the responsibility and the legitimate interest of the pediatrist in the problems of child guidance about which these gentlemen have been speaking?

It is obvious from the nature of his comments that Dr. Blatz has addressed himself to these problems from a most constructive point of view. He has considered normal developmental processes and has referred to some of the fundamental knowledge we must have at our command if we ever are to deal professionally with behavior, normal or otherwise.

Dr. Beverly and Dr. Parmelee have so vividly indicated some of the practical problems that confront pediatrists in this difficult field. The pediatrist is in a tough spot in attempting to be oriented in the welter of interest and of knowledge that is arising about behavior. Actually the difficulties in behavior about which pediatrists are consulted are of wide range, from the standpoint of causation. It is obvious that there must be categories of problems, some of which fit rather precisely into the field of experience and practice of the pediatrist, some undoubtedly fall outside his field of interest and responsibility and are more the problems of the educator, and sometimes those of the psychiatrist.

I wonder if it would not be a constructive thing for the pediatric group to strive for a certain sharper definition of categories of problems, so that they might address themselves with greater confidence to those problems that reasonably fall within their field of interest and practice and with equal confidence steer other problems to those persons best equipped professionally to deal with them. To illustrate, let us assume a situation of temper display in a child who makes poor school

progress, who is a source of sufficient concern to his parents that they seek advice. The pediatrist may most readily appreciate temper display in relation to physical states or factors conducive to irritability, overfatigue, metabolic disturbances, endocrine imbalance. Medical observations will demonstrate the pertinent facts and direct physical hygienic or medical treatment may be in order.

If the child happens to be suffering under the handicap of a specific reading disability similar to the group of cases Orton, Monroe, and others have investigated so carefully, only a testing or psychologic diagnostic procedure will show us that this child reverses his images and does not learn to read because the learning processes are disturbed through a visual peculiarity. Only then could one make any progress in handling temper display based on such a difficulty.

Suppose he is the only child that Dr. Parmelee has been talking about, one who has been indulged and has discovered that he can gain his ends through temper display. The same symptom appears in relation to very different causal factors. Again, suppose one is dealing with a situation of temper display based on definite rejection of a child by the mother. I am thinking of a young woman, really not interested in her child, who remarked, "Well, when I had him, I felt as though I had laid an egg and was through." Of course, I am indulging in great oversimplification, but I wish merely to indicate that the major treatment steps in temper display (as in other behavior symptoms) at times may be medical, at times dependent upon educational or pedagogic measures, sometimes consist of "good advice" to the parents, and yet again may relate to fundamental problems of parental attitudes best approached through psychiatric methods and treatment.

I think we would do well if we familiarized ourselves a bit more fully with the type of developmental considerations Dr. Blatz has stressed, and if we applied to the practical situations before us some of the differential diagnostic principles that we insist upon in our medical problems. Pediatrists can deal successfully with a considerable but selected group of behavior problems. They have a great advantage by being in contact with the child so early in life, by knowing so well the actual development of small children, and by virtue of the confidence mothers place in them. Frequently they are not in a position to use this advantage because of lack of sufficient knowledge about the actual developmental process they, as pediatrists, are endeavoring to further. More particularly there is insufficient realization that this process is so dependent upon the fundamental social character of the home and upon fundamental attitudes of parents.

Dr. Beverly is correct indeed when he says that parents frequently cannot and will not carry out perfectly good instructions given them for the handling of various problems of conduct. Often we do not realize that many parents are helpless, in the face of their difficulties, to carry out the recommendations we make and which they would like to carry out. The feeding problem based upon overanxiety of an inexperienced but healthy mother dealing with her first child is not the same feeding problem as that dependent upon major disturbance in the family life. In the former, the mother can profit by instruction and advice. In the latter she may require assistance in a major reorientation in her personal life and anything less than this does not really touch the problem. The former is a task for the pediatrist, the latter for the psychiatrist. Both come to the pediatrist under the same guise and in the same external form.

We will greatly simplify our difficulties if we insist on at least recognizing the nature of the problems, deciding which of these we can deal with, and assuming a more sophisticated relationship with educators, psychiatrists, and psychologists who have something to contribute to various diagnostic and treatment aspects of the total

task. If we do this, I believe pediatrics will be greatly enriched and will achieve the place it should assume in the wider effort to build children who are not merely physically sound but who also are competent social human beings.

E. J. HUENEKENS (MINNEAPOLIS, MINN.).—I think education of children has two main functions. One is to develop the individual talents of children. The other is to make social beings of them.

I think modern psychology in general has made too much of a function of the development of the individual talents of children and not enough attention has been paid to the function of making a social being. I think it is a question of emphasis, and in emphasizing too much the development of individual talents the swing of the pendulum is away from the old-fashioned discipline, and now we are going too far in that direction.

I am a great believer in nursery schools, for one of the big problems is to get children away from their mothers. One of the ways is to get them in a nursery school. I think it is a very important, practical thing, something that can be comparatively easily done, and the results are very gratifying.

Nursery schools need not be very elaborate affairs. There are quite a few of these schools in Minneapolis. They are just neighborhood projects where six or seven children congregate every day. I think these small schools perform almost the same function as the very elaborate school.

The main idea of the nursery school is to get the children away from the home surroundings and the attention and sympathy they get there.

One of the things the pupils of Freud have done is to establish nursery schools in Vienna, using these nursery schools to handle problems in children of a pre-school age.

I, personally, feel that is a very powerful weapon. It is a simple thing to place a child in a nursery school and it accomplishes a lot which, if you tried in any other way, would change the entire attitude in the home. This should be tried also but is very much more difficult to accomplish than temporarily taking the child out of the home for several hours a day.

DR. CHARLES A. FIFE (PHILADELPHIA, PA.).—I came to this session from a lack of knowledge of the subject, and I came to learn. Since coming here I realize more fully my ignorance. The little success that I have had has been due to the realization that the child problem is a parental problem. The only way we have made any progress is by spending a very great deal of time and patience and a good deal of tolerance in working with the parents, not only the mother, but also the father. Dr. Mohr and you have said the relationship, their habits and attitude of life, is so close that it seems to me there is no other way. It is a time-consuming and worrying problem, but the only possibility of success, I think, in pediatric practice is by that method. It is the study of the parent in the great majority of cases that gives the insight into the child problem, assuming, of course, that the physical side of the child and the question of hygiene have been thoroughly gone into.

DR. ROY P. FORBES (DENVER, COLO.).—I was very much interested in Dr. Huenekens' remarks about the play school. I have found it of great value in many habit-training problems, and we have encouraged mothers to start little neighborhood groups of their own, with their own children and the neighbors'. It has helped a great deal with perfectly normal and easy cases, but it does not solve the problem for some of the more difficult children. Furthermore there are many parents who cannot afford to send their children to a nursery school.

I have not always felt myself competent to solve all the problems of mental hygiene, and even though I could in many cases work them out I have not always had the time which was required. I tried a few years ago having a psychologist help two days a week with these habit-training problems. This was very well worth while, but such a helper is a real luxury. If one can afford a psychologist, who can go into the home and get more information than we ourselves can often obtain, I think we could frequently do a great service to the family. Such an assistant is a prohibitive luxury to most of us.

The field of parent education remains as yet almost untouched. An experiment of five years' duration in Denver is this year being taken over by the public schools. It is a preschool demonstration sponsored by the Denver Tuberculosis Society as an experiment in parent education. The various schools were taken as demonstration centers, and children from two to five years old were examined and admitted to classes. While the children are in a play group under trained leadership, the mothers are in a class in which they receive what I should call a very adequate education in the essentials of child psychology and habit training.

I attended one or two of their sessions and was amazed at the depth of their studies. These study groups of about twenty-eight mothers meet twice a month with a trained leader, with an outline to follow throughout the school year. A different course is given each year, so that at the end of two or three years these mothers have amassed a tremendous amount of valuable information, and their children who finally enter the public schools, having been in this play school, are said by the school nurses and teachers to be infinitely better prepared for their work, easier to handle, better physically and socially than the average child.

I believe that eventually parent education of this type will solve for the pediatrician a great many of his problems which up to date we have not been able to solve for lack of time and proper facilities. I look forward to the experiment being extended to other cities.

DR. PRESTON A. McLENDON (WASHINGTON, D. C.).—I hope my attitude toward child psychology is practical, corresponding to the expression of Dr. Forbes and others. In the first place our attitude toward the new baby I feel is quite important. So often the pediatrician overemphasizes the problem of the new baby and gives an otherwise sensible mother an exaggerated idea of the work necessary to the care of a newborn infant. He attaches too much importance to the usual little problems and does not allow the mother to follow some of her own maternal instincts, which are definitely good. This is particularly significant in the subject of "regular feeding schedule." As Dr. Blatz so clearly pointed out, hunger contractions occur at physiologic intervals, yet we demand an "alarm-clock schedule." The baby cries and is fretful because he is hungry, not colicky, yet the time for feeding is thirty minutes distant. The mother thinks this crying is some serious ailment and immediately your first "problem" has its incipiency. Would it not be far better to develop this "schedule" over a period of weeks?

Again this same "hunger manifestation" may show itself in the older child who has temper tantrums, night terrors, etc., and becomes disobedient. These children apparently become hypoglycemic, as suggested by Cameron. He advocates the use of glucose in many of these cases and reports definite results. Particularly is this method useful in certain cases of enuresis.

There is one question I would like the Chairman to answer; that is, how harmful are the apparatuses advertised to "keep the baby covered." They emphasize freedom of movement in the crib, yet such a confined child cannot sit or stand. It seems to me this is an entirely erroneous method to use to secure a peaceful sleep. One article endorsing such methods was recently published in our own

magazine, *Hygeia*. In the same manner is not the play pen harmful in that it does not allow the run-about, active child, mentally and physically alert, to satisfy his curiosity and desire for exercise?

DR. LOUIS C. SCHROEDER (NEW YORK, N. Y.).—Most pediatricians are in the same position that Dr. Fife mentions. Our work is limited to what can be done through the parents; nine times out of ten this means the mother. Those pediatricians who have been willing to give the time to following the literature relating to child behavior know full well that case studies requiring a psychiatrist, a psychiatric social worker, and a psychologist working together have been the only means by which genuine advances have been made. Such teamwork is available to very few active practitioners. What should be done by psychiatrist and psychologist is to lay down for the individual practitioner, whose value in all preventive medical work is seldom appreciated, such concepts as the individual can actually find useful in his practice. Take, for instance, the question raised by Dr. Huenekens as to the advisability of sending two- or three-year-old children to school. Surely no thinking person would advance, as a broad concept, that such a procedure is desirable because it separates mother and child for a while each day. Granted that mothers make mistakes, and that undoubtedly in certain instances such a reason is a good one, one finds that in actual practice it is certain in many instances to draw ridicule, especially from mothers who are doing a good job. What mothers can understand is, it may be desirable, even at the early age of two or three, to find out what sort of a social approach her child makes toward life. That, she can appreciate.

DR. MAURICE J. LONSWAY (ST. LOUIS, MO.).—I am a strong advocate for trying to teach the mother to recognize the problems before they get to be troublesome. It is sometimes rather difficult to do that, but when we try to start the new babies on a feeding schedule, and give them orange juice, viosterol, and all that, we do avoid a lot of problems.

There are fewer pediatric problems when we see babies right from the beginning than when they come to us from outside sources at a later time. Most of the problems come from homes not having children's specialists, or instances when they are from our own practice, they are not seen regularly. Sometimes in these homes the children are put to bed at all hours of the night, taken to picture shows, and fed anything under the sun. My impression is that most of the problems come from that kind of home.

DR. SAMUEL McC. HAMILL (PHILADELPHIA, PA.).—I am here more as an observer. I would like to say I am very deeply interested in this discussion this afternoon. It seems to me that a very important thing for us to stress is the early recognition of these abnormal attitudes. That involves the establishment of the right attitude between the pediatrician and the parents. That is basic of the whole thing. We ought to gain the confidence of the parents and establish a relationship which will insure us of having their full confidence and willingness to follow the advice we give them.

One other thing—we should recognize the fact that each of these problems is individual. I don't believe, for instance, that we can say that all children should go to nursery schools. I think there are certain children, under certain circumstances, who would profit very much by separation from their parents, but I have seen a great many children in my career where it would have distressed me very much had it been necessary to separate the child from the parent. I don't know whether that is apropos at all in the discussion of how we are going to train the pediatrician for this problem. If it is a consideration at all, I should like to hear Dr. Veeder say something about that.

DR. S. C. HENN (CHICAGO, ILL.).—When I was in medical school I was impressed with the idea generally that in undertaking any problem we should not be prejudiced but should look at it from both sides of the fence. I just wonder if enough of us have the parents' viewpoint. When they first bring the baby home, they start getting information—from the radio, from the daily, weekly, and monthly papers. Many times the articles do not agree when they talk about the same thing. In addition the parent gets information from the doctor, and probably her friend has a doctor who has some other idea that is exactly opposite. So I wonder, instead of considering the child's viewpoint, if we should not look at it from the parents' viewpoint, realizing that in the beginning a lot of them are confused from the information they receive and do not know where they stand. I have no suggestion for overcoming such a thing, but I believe we should consider the information that many of these parents receive.

DR. LAWRENCE I. CLARK (TOLEDO, OHIO).—If a layman were to come in here this afternoon and listen to the discussion he might get the idea that all pediatricians think most parents are poor parents. I am not at all convinced that the parent cannot rear children perfectly well without the help of nursery schools. If we attempt to send all children to such schools, I believe we avoid the duty that ordinarily falls to the pediatrician and to the parent. It is very much an individual matter whether the child be sent to school or whether it be kept at home.

DR. EDWIN GROVER SCHWARZ (FORT WORTH, TEXAS).—In reference to nursery schools, some woman out of employment who has had some faddist education—very often she is a food faddist—decides to establish a nursery school, and she feeds the children in ways which are not practical.

If we are going to recommend nursery schools, I think we should have a rather strict supervision of the instruction.

Some parents have established floating nursery schools, and the children have to get accustomed to one mother this week, and next week they have to accustom themselves to another mother.

DR. LANGLEY PORTER (SAN FRANCISCO, CALIF.).—I have been wondering since I have listened to this discussion whether we are not often mistaken in our attitudes toward children. In our discussion we often talk as though a child were a finished personality. We talk as though a human being were something finished and ended at any given moment of life, which is entirely an erroneous conception.

From the emotional side a child, a man, or a woman is no more than a bundle of reactivities, responding to the influences of individuals, events, and things in the environment. Any one of us in this room full of people reacts quite differently than we would if we were together in the room with only one individual. It seems to me that Dr. Mohr's request for categories is a wise one. I am the only grandfather in the room, so I go back a great many years, and I have seen a great many problem children, and I have seen these and many more children grow up. I could testify honestly that some of the worst problem children are now among the best of our citizens, and some of the most exemplary children are among the worst citizens we have.

I think we lay too much stress on the lesser of these so-called behavior or personality problems. As physicians we have a technical interest in the matter, and this may lead us to exaggerate, in some degree, the importance of our intervention; to overstress the importance of interfering between an unwise mother and her child. There is a great flexibility in reciprocal human relationships. And perhaps these very behavior problems that we so often worry about in the child may be remedial, may be forces which drive the mother to reconsider her relationship and force her

from a position of being an inefficient or a nagging mother to that of being a good guide for her child. This reconsideration may even send her for information to consult a trained man, a pediatrist or a psychologist.

To return to the matter of category, it seems to me that for the practical purposes of pediatric practice one can use three categories with a reasonable certainty of success. However, one must be sure that the physical conditions which create behavior anomalies have been looked for and excluded—hypothyroid and hyperthyroid conditions, postencephalitis, and the great group of fatigue states, as well as the hypoglycemias and a number of other things which, I fear, are too often overlooked.

The need for determining and excluding these physical factors before proceeding to treat little patients for uncomplicated emotional problems is one of the most important of our duties.

If you exclude those classifications just mentioned, we have left three categories: the hyperego; the child whose environment is made too simple to his boredom; the child whose environment is too complex, and who therefore becomes excited and fatigued. I think the pediatrist can put most of his emotional problems in one or another of these categories. If the problems do not fit here, the help of a psychologist or a psychiatrist is certainly needed. I think that our problem does not concern so much the child as it does the child's environment.

By the environment I mean the human environment even more than the physical. In this phase of therapeutics the pediatrist has the advantage over the psychiatrist. In the natural course of things the pediatrist must come to know not only the child afflicted, but the father and mother and the other children of the family and the servants and nurses as well. These latter in well-to-do families are probably the most pernicious of all influences in developing behavior problems among young children. If the pediatrist knows these things, and if he does not expect a child to be a finished personality at any given moment, he will be of real value to parents and to their children. To be successful he must know the parents and bring them to understand that if a child has a problem today it may solve itself by next year, and that some other expression of awkward adjustment may be expected to rise up as a personality problem.

I happen to have a wife who is a grandmother and a very interested observer of children. Long years ago she said to me, "One of the important things that I have learned about children is that the things you worry about this year you have forgotten next year, and next year's problems are an entirely new set."

I believe that if we can school ourselves to pay less obvious attention to the child we will have fewer egocentric problems to deal with, and that we can pay more attention to the environment, give more time to studying it, to learning how to deal with it, to developing better means for modifying the child's surroundings. We can learn how, and we can teach the parents to avoid the development of too simple an environment for one class of child, and too complex for another.

I think that this modern studying and dealing with environment is a major therapeutic method in the practice of pediatrics, when the pediatrist gets beyond his depth he can have a psychologist or psychiatrist to aid him.

Among the changes that it seems to me have come about in pediatrics and in every other circle of medicine is the fact that the modern physician has ceased to be an individual apparatus for the care of sick people. He has come to be an administrator of health services, and one of those services that the pediatrist can administer and does administer for the benefit of the family in his charge is psychologic. There are today many very well-trained psychologists whom he can take as colleagues.

I agree with Dr. Forbes that it is a good thing to have a psychologist attached to the pediatrist's staff. But I do not agree with him that the association is too expensive for an ordinary pediatric practice. Certain people are always glad, and I believe always will be glad, to have such a psychologist if sent to them by their family physician or family pediatrist and to pay for his services.

If these two, the psychologist and the pediatrist, work together to study the total situation, the child's personality and his environment and to develop an understanding of the full family relationships, as well as what the child's needs are, and how the environment can best be adjusted to meet these needs, then success will be certain, for in this way the emotional disturbances which we call behavior problems can to a large measure be prevented.

DR. EDWIN P. RUSSELL (BERWYN, ILL.).—I was interested in what Dr. Henn had to say about the education of people along this line. Comparing it with the feeding problem, if we have a feeding case brought to us we tell the mother, "Don't go by any particular book on infant feeding. We prefer you don't have one. I will tell you how to feed this baby, and I want you to follow my instructions."

However, when it comes to the psychology of the child, I don't think any of us feel ourselves capable of saying, "Discard your books. I will tell you exactly how to train this child as he develops."

I am impressed with the fact that many of the mothers who read come to me full of knowledge, most of which is wrong. They have read many, many things, and they know a great many things which I feel are not the right things. They are influenced by the newspaper columnists—I hear Angelo Patri quoted and Gladys Huntington Bevans—and I am unable to counteract some of their arguments. Some of them I know are fallacious. However, I am not able, because of my lack of knowledge, to help them as I should.

I feel sometimes when I read a book that I do know something about it. Then for some reason I send a child to a psychologist, and I am impressed with the fact that I was all wrong.

For instance, I sent a child that I thought was subnormal mentally to a psychologist, and the report came back that this child was of superior intelligence. I had thought that this child was not afraid of God, man, or devil. They said this child's whole trouble was fear.

So I feel I have been left way behind in the smoke and dust by the psychologist, and yet I feel as though I should do something about it.

I would appreciate it very much if one of you who knows the bibliography would tell us something about books which we can read, and read along with the parents, and what book can we give and recommend to the parents which will not be wrong, and are there any?

DR. BORDEN VEEDER (ST. LOUIS, MO.).—This Round Table reminds me somewhat of a discussion some two years ago in Philadelphia. When it came to discussing the question of books on this subject, everyone was in agreement that there was no satisfactory book or combination of books. The pediatricians felt that the book should be written by a pediatrically minded psychiatrist, while the psychiatrists felt that a book on behavior problems in childhood should be the product of the psychiatrically minded pediatrician.

I feel that the subject of behavior problems and child psychology today is in much the same situation that infant feeding was in a few years ago. There were no clear-cut measures or procedures at that time. Finally after many so-called scientific and pseudoscientific methods, we have reached a rational means of feeding

the baby, realizing after all that nutritional problems are relatively simple and that the really important thing is their prevention.

I feel in the first place that our difficulty lies largely in not knowing what constitutes a problem in this field. Children are individuals. The same conduct or behavior reaction that requires attention on the part of the physician in one child may in another child be insignificant and of little importance. I do not believe we know how to differentiate the importance of behavior problems at present. We are always facing a very definite question when any problem comes up. Is this significant and of importance or will the child just grow out of it if left alone? In other words, should the specific problem be considered of importance or not?

From the standpoint of the practicing physician differentiation or formulation of the problems and their treatment is the thing that is most needed at the present time. In other words, we need a certain formulation of conduct and behavior reaction problems in children in the same way as we have more or less formulated our nutritional data. I realize the difficulty, but I do not believe that it is more difficult of solution than the nutritional problem.

A good many of our nutritional problems have arisen from the fact that through public lectures, radio talks, mothers' classes, and all that sort of thing about rearing children, every child is placed in one group. If you feed them all alike they all ought to thrive. We know this is wrong because children are individuals and their individualization in large part is a constitutional matter derived from their heredity. I believe the same thing holds true in the psychologic field and that there is a tremendous factor of heredity in the development of conduct and behavior reactions. This, of course, is a dangerous thing to tell a parent, because we know one of the most common devices of parents to escape responsibility is to place the blame on heredity. But undoubtedly the type of problem frequently has a constitutional background. We cannot change the constitutional type of the child so that the only thing we can work on is the environmental situation. I do not think, however, we want to fool ourselves with the idea that by changing the environment of the child, as regards home, school, social, or anything else, we are going to stop or cure all of the problems that arise in childhood.

Turning to another aspect, my feeling is that the function of pediatrics in regard to behavior and conduct reactions is very largely that of prevention or preventive pediatrics. I believe in the vast majority of instances it is possible to stop problems from arising or to stop them in their incipiency so that the problem does not become of real importance. We can compare it with the field of nutrition where the individual may have some signs of rickets all his life and still be a good athlete and a very healthy individual. Many problems that arise in childhood will not interfere with the individual's social adaptation in the home and to society. I believe we will eventually be able to analyze to a considerable degree the types of problems we run into on the basis of prevention. In other words, you must largely handle the child through the parents. There are certain types of parents and certain types of homes in which you can almost positively say that certain types of problems will arise in the children of these parents or in these homes. For example, the home in which the mother is a convention-attending woman, reading all sorts of books on child psychology and believing the last book she reads, nine times out of ten you will have a problem which basically is due to solicitude and overprotection.

It seems to me that it is possible by studying the family to gather the individual type of problem that is likely to arise in the children, and that it is the function of the pediatrician to recognize this and from the very start work to prevent the development of the problem and an acute situation.

Another question that arises is as to how far the pediatrician should go in the handling of behavior problems once they have arisen. I am quite sure the vast majority of behavior and conduct problems in young children should be handled by the pediatrician. It is not as a rule necessary to bring the early type of problem into the child guidance clinic or to the psychiatrist. They fundamentally are not psychiatric problems or even potential psychiatric problems. Many however may require the help of a psychologist, as, for example, types of school problems. First of all, we must know in school problems that retardation or difficulty is not due to physical fault. Then comes the question of mentality, when, as a rule, the psychologist is needed. Eliminating the physical and mental side we come back again to the environment, which may be the reaction of the child to other children in the school or to other children in the family. It may be solved by simply changing schools. School problems can frequently be foreseen, particularly when there is a jealous attitude between two children in the same family with different intellectual capacity. By starting them out in different schools, the development of the problems is frequently prevented.

I must disagree with Dr. Huenekens as I do not think very much of the formal nursery school. The trouble is that some one who takes a course in some university comes home and starts a nursery school. She may be temperamentally unfitted in every way possible to run a nursery school. She puts to work all sorts of theories and ideals which she really does not understand. Second, there is the danger of mixing young children together for physical reasons. The third reason is that the average child you want to send to a nursery school is a problem child. The first thing that happens is that you have a big group of problem children together, which in many ways is just about the worst thing that could be done in handling a problem child.

If I might discuss one more thing. Training in behavior work and child guidance work has interested me a great deal in the last few years. The question has been discussed again and again as to how the younger physicians can be trained to recognize and treat the average behavior problem in children. First of all it is a question of creating interest and recognizing that there are such things as behavior problems. We have created this interest by giving courses to the students with actual work in the field and find them taking a great deal of interest. A few years ago I had one of the younger pediatricians trained to handle the behavior problems in the infant welfare clinics, as it was impossible to get the average attending pediatrician to bother with them. The men who have been trained as internes in our hospitals in the last few years, however, are unwilling to turn these problem cases over to the special physician. They desire to look after them themselves and are doing very good work. If we can give to our students in the medical school years of actual experience in behavior problems, it is not at all a difficult thing to arouse their interest.

DR. E. J. HUENEKENS.—I am very sorry to have Dr. Veeder disagree with me, but I still think I am right and he is wrong. In the first place, I don't believe in sending all children to the nursery school. If I gave that impression it was the wrong one. In fact, I send only the small minority of patients there. But where there is a problem in the home, an excessive amount of attention on the part of the mother, for instance, the child is benefited by the nursery school. He is chiefly benefited by the fact that instead of acting as individuals the children are acting in groups. I think it is the group doing of things that helps them enlarge their social experience, helps make them adults early. That is the real problem of our education, to make them independent, more like adults, than dependent children.

I think that happens in inferior nursery schools, to some extent. I think for that type of child any nursery school is better than the home environment, be-

cause it enlarges their experience. You might be able to do that by changing all the home environment, but that is a pretty large job, in many cases.

The other thing I wanted to say is that perhaps I gave the wrong impression about the psychologist overemphasizing training in self-expression, and so forth. Perhaps they don't, but the effect on the parents who read all the miscellaneous literature on child psychology is the overemphasis. That is what I object to. It is not so much what is actually said as it is the effect on the people who read it.

DR. BORDEN VEEDER.—I agree thoroughly that the play group is necessary for any child, particularly in the case of a single child. Then the child must get into a play group. But I consider that is quite different, and I think those in the nursery school movement consider that quite different. I discussed definitely what they call a nursery school.

DR. E. J. HUENEKENS.—I think we agree, because I only send them to the nursery school because I can't get them to play.

DR. J. VICTOR GREENEBAUM (CINCINNATI, OHIO).—For over ten years, ever since the Child Guidance Home at the Jewish Hospital in Cincinnati was organized, I have used its material to teach the senior medical students the nature of disturbances of behavior as they occur in children. I have particularly stressed the medical approach to the subject of behavior problems of children.

Dr. Louis A. Lurie, director of this institution, read a paper several years ago before the Section of Pediatrics of the American Medical Association in which he pointed out the importance of the medical approach of the study of these cases. As a result of this method of approach, a large number of children with behavior disorders were found to be suffering from physical disturbances, such as heart disease, malnutrition, tuberculosis, impairments of hearing, eyesight, speech, and the like, that were related to the behavior difficulties.

At the Child Guidance Home, students are taught that difficulties of behavior are due either to abnormal conditions in the child himself, or to various environmental influences, or to a combination of the two. We have designated the first as endogenous causes, the second as exogenous, and the third as heterogeneous.

I think that this is a satisfactory description of the categories of the causative factors of behavior difficulties which need was mentioned by Dr. Mohr. In our study of over one thousand cases we have found that nearly 60 per cent of the behavior disorders that occur in childhood are due to endogenous causes, 25 per cent to exogenous, and 15 per cent to heterogeneous causes.

On the basis of these results we have impressed the students with the necessity of making a careful medical examination. Again and again we have emphasized the need for approaching a child who shows a behavior disorder in the same manner as one approaches a child with a physical ailment. Some of our most satisfactory results have been in those cases where an endocrine disturbance has been found to be the causative factor of a behavior difficulty. About 10 per cent of the children studied showed such endocrinopathic states. Some of these cases were described in a paper which I read before the Section on Pediatrics of the American Medical Association in New Orleans last year.

This article only appeared in the *Transactions of the Section on Pediatrics* because, strange to say, the editor of the Journal felt that such cases were not of sufficient interest to the general practitioner and hence would not permit its publication in the *Journal of the American Medical Association.*

I know that some of the men here today were leaders of the White House Conference meetings. This conference has published some very valuable mate-

rial for parents which I have used frequently. I have also had occasion to recommend to my students the report of Dr. Bronson Crothers on this subject, which is also most valuable.

The discussion today has been very interesting. I am glad that I attended Doctor Beverly's Round Table. I shall continue to teach my students with more assurance to consider the child himself in order to get the best results in solving the disturbances of behavior. There is much to be done for him other than changing his environment, important as this may be in some cases.

DR. W. E. BLATZ (TORONTO, CANADA).—Gentlemen, I am terribly disappointed. How many here have spent one whole day in a nursery school? Three of you. Then I wonder if your criticism is fair. I can look back, theoretically, say forty or fifty years and hear some of the men then who were middle-aged say, "The idea of sending everybody to public school. The idea that we are going to send these children out of God's sunlight and green grass into these schools."

I would say that you are not familiar with exactly what the nursery school is trying to do. Perhaps, as an expert witness I should tell you a little bit about my own experience.

I directed a nursery school for ten years. I have been in charge of a school of fourteen hundred children, a public school, for ten years, for the mental hygiene aspect. I have my own progressive school, and I am the psychologist of the Juvenile Court and consultant to one of the big private schools in adolescent age, and you say the psychologist is not pediatric-minded.

When I came down here I thought I was going to meet a group who were seriously interested in being, as well, pediatrically minded and psychologically minded. No one will say you can look at a child from one angle; it must be both. I have not seen much evidence of that. You certainly would not take the evidence of anybody who was not a physician on the treatment of anemia. You would never take their evidence on how you should take out an appendix.

You say that these books these parents read do more harm than good. I have had a parent education class. We have an organization there that is second to none in this line, and we have a five-year course for parents; I would say that I could bring ten parents down here in this room and give an examination on how to bring up children to those ten parents and to this group here, and I will wager that the parents' marks would be 25 per cent higher.

Now, what I say is this: There is handwriting on the wall and I am going to be a prophet. If there is one group of people that should take over the bringing up of children it is the pediatrician, but he must learn before he can practice, and I would guarantee that in ten years, if this group met here together, the type of discussion that we would hear, providing they learn, will be so different from this that it will be as the difference between a kindergarten and a graduate school.

That handwriting on the wall is this: If the pediatrician does not make it his point to learn what is worth while in psychology, you will find that other people will take it over.

Why criticize these parent education groups? Because the pediatrician is the most difficult person in the world to take it over. I speak from experience. I come from Toronto. You know some of the pediatricians there. I have as low an opinion of some of them as you have. The reason for that is that there has not been one pediatrician, except Dr. Tisdall, who has come into the nursery school to see what it is.

The nursery school is not for problem children. And I will say that 50 per cent of our problem children are children of physicians.

I am terribly disappointed. I come here as a guest and I am being discourteous, but I say I have heard more intelligent discussion from a lay group on how to bring up children than I have heard here this afternoon. (Laughter and applause.)

DR. SAMUEL McC. HAMILL.—I would like very much to know whether Dr. Blatz' attitude toward nursery schools in general is the same as his attitude toward his own school.

DR. BORDEN VEEDER.—I was just going to tell Dr. Blatz I thought it was not the objection to a nursery school in particular, but the nursery schools as commonly run throughout the United States.

DR. W. E. BLATZ.—I will go further than that. You have some 390 nursery schools in this country. We have one in Canada, so far. The one in Canada, I think, ranks with the best here in the States: Cornell, Harvard, and so forth. The Manhattan Nursery School I know about.

In regard to these small nursery schools that you talk about—I have every faith that there is no graduate here from Vassar to defend them, so I will, because there is a good nursery school at Vassar. I will say this, how many mothers who bear children take a course in how to bring up children? I'd like to know that and I'd like to know whether you feel that with the rather cursory supervision that a pediatrician can give or has given, whichever of those is right, whether you have taken the responsibility of teaching them, these parents, how to do it.

We won't consider the bad nursery school. After all, we are not considering bad pediatricians. We are considering good ones. I will go further than this and say that I would not be afraid to prophesy that the next move in public education will be to make nursery schools compulsory. I will say that if you get a good nursery school under good management, there is no home on God's green earth that can be compared with the discipline, social development, emotional development, and intellectual development of that nursery school.

When I use my own, of course, I am prejudiced. I think mine is the best.

There is a very excellent book by Richards, but you can't expect these women to take over these books and carry on. You would not place Holt's book or even Dr. Tisdall's book—I am not familiar with other books on pediatrics—into a woman's hands and say, "Here, God bless you! Bring up your child," any more than you do with the others.

I would say that the most important thing in regard to books is for the pediatricians to read them, and then with their knowledge of pediatrics, to interpret that psychology. Then, perhaps, we will do better.

DR. ARTHUR H. PARMELEE (CHICAGO, ILL.).—Dr. Blatz' remark reminded me of what Dr. Veeder said, that the problem we pediatricians face now with regard to the psychiatric problem, with regard to children, is the same as with the nutritional problem twenty-five years ago. Twenty-five years ago mothers found out very early that the doctors did not know about infant feeding, so they started to feed them themselves and within a few years they knew more about infant feeding than the doctors did, and they stimulated interest, and the doctors found that their infant feeding problems were disappearing to other places where they could get what they wanted.

The public is the leader always. The mothers know more about psychology, and the mothers have forced us into it. They come to us and ask us questions,

and we don't know a thing about it. Then we find out about it, so I think it is a compliment that we are gathered here and are trying to find out something about it.

DR. BEVERLY.—I wish it were possible for me to summarize this conference. I would like to say a few things, rather encouraged by my associates' closing remarks.

I think the future of pediatrics depends, to a considerable extent, upon the attitude which pediatricians take toward mental hygiene. I don't believe the pediatrician can continue as a specialist if he is going to confine himself to the feeding of children and the treatment of colds which, as we all know, make up about 95 per cent of the private practice of most pediatricians.

The mental side of children as a specialty is coming. Either we are going to take it over or somebody else is going to take it over.

I don't believe it is difficult to understand most behavior problems in children if you keep in mind a few general principles and realize there is a reason for all behavior. There is just as much reason why a child soils his bed or runs away from home as there is for the profound acts of wisdom of which we boast.

I have a scheme that I like to keep in mind in analyzing behavior problems. In the first place, I like to think of a child with certain potentialities for development which are present at birth and which cannot be changed. Those potentialities may be divided into three groups: first physical development. A child develops according to a definite pattern. If he is potentially a small child he grows up to be a small man, in spite of anything anybody can do. If he is a slender type or short, heavy type, he follows that pattern.

Second, children are born with different potentialities for development of intelligence or mental capacity. If a child is born feebleminded, he dies feebleminded and nobody can change it. I think it is true, as indicated by Dr. Russell, that it is impossible, in many cases, to recognize mental capacity without special mental tests. I have made tentative diagnoses of feeblemindedness in children and later found them to be of normal or superior intelligence. Anyone who has not had this experience has not attempted to determine the intelligence of many children.

The third potentiality for development which is present at birth is emotion. This has been described by Dr. Blatz, Dr. Mohr and Dr. Parmelee. We have to recognize a definite emotional pattern development.

We can divide emotional reactions into three groups. They are present at birth and their development can easily be observed.

The newborn reacts to certain stimuli—such as a sense of falling, loud noises, hunger, pain, etc.—by crying. We see this same reaction develop into temper tantrums and the fight for independence which we recognize as one of the most important drives back of behavior. Independence is a necessity in growing up. It represents the instinct of self-preservation. The negative side of self-preservation is represented in fear, which is the second primary emotional reaction which is recognized. In excess the child develops into a fearful, resentful type. The third primary emotional response is also recognized in the newborn. When in distress or frightened, the baby is pacified by fondling. We see this reaction develop into an attachment for others, first mother and eventually one of the opposite sex. These impulses represent the instinct of self-preservation.

A child with specific potentialities for development, controlled by specific impulses, reacts to a particular environment and the product is behavior. The nature of the behavior depends upon all of the factors involved. The boy with a

large stature has an easier time growing up than the small effeminate type. The child with an apprehensive parent is more frightened, etc. If these various factors—innate as well as environmental—are analyzed, most behavior becomes relatively simple to understand. I believe most cases can readily be understood by pediatricians if they keep in mind the general principles of behavior.

If there are no further comments, the meeting stands adjourned.

The meeting was adjourned at 4:30 P.M.

Erratum

In the American Academy of Pediatrics Proceedings published in the May issue of the Journal, line 15, page 708, should begin "Dr. Edward C. Mitchell" instead of "Dr. Frank T. Mitchell."

News and Notes

On June 9 and 10 **The American Board of Pediatrics** met in Cleveland. One hundred and sixty applicants in Group I were certified on record, and a number were held over for examination at a subsequent date and for completion of records; eight applicants in Group II were examined, and seven were certified. Of six applicants in Group III, three passed and were certified, and three failed.

The Board is arranging for an examination to be held in Minneapolis at the time of the meeting of Region II of the Academy early in October for those applicants who desire to appear for examination at this time, and an examination will be held in the East in the fall. The exact dates will be announced later.

Should the number of applicants for examination be large enough to make an examination practical, an examination will be held in the South at the time of the meeting of the Southern Medical Association, and some time during the winter on the West coast.

Application blanks, information, etc., may be obtained from the secretary, Dr. Charles A. Aldrich, 723 Elm Street, Winnetka, Illinois.

At the time of the meeting of the A. M. A., a meeting of the joint specialty boards was held, and the American Board of Radiology was admitted to membership. Several actions of great importance in the field of specialization were taken. Full details will be published later.

At the forty-sixth annual meeting of the **American Pediatric Society** at Asheville, North Carolina, May 3, 4, and 5, the following officers were elected for the ensuing year: Dr. Borden S. Veeder, St. Louis, Mo., President; Dr. Henry J. Gerstenberger, Cleveland, Ohio, Vice President; Dr. Hugh McCulloch, St. Louis, Mo., Secretary and Treasurer; Dr. C. A. Aldrich, Winnetka, Ill., Recorder and Editor; and Dr. James L. Gamble, Boston, Mass., Member of the Council.

The next annual meeting will be held at Wade Park Manor, Cleveland, Ohio, early in the month of May, 1935.

The British Paediatric Association held its annual meeting at Windermere, in the English Lake district, on April 27 and 28 of this year. Dr. Eric Pritchard presided. The resignation of Dr. Donald Paterson from the secretaryship was received with regret, and the Society made him a presentation to mark its appreciation of his services. He has been Secretary of the Association since its formation seven years ago, and his work and energy have been largely instrumental not only in bringing the Society into being, but also in getting it so well started upon its present happy course.

The meeting was well attended and successful; a short abstract of each paper presented will appear as usual in the Archives of Disease in Childhood in due course. An interesting discussion was opened by Dr. Reginald Miller on the uses and abuses of the Infant Welfare Centre, the criticism of such centres being more destructive than constructive. A suggestion for the foundation of a special diploma in paediatrics was brought forward, and on the whole was favourably received.

The whole matter of a pure milk supply has again been attracting considerable attention in England; the subject has been ventilated not only in the medical but also in the lay press. The question of raw versus pasteurised or boiled milk is always a somewhat bitter one over here, because of the various interests involved. The medical fraternity are, however, generally speaking quite opposed to the use of raw milk in infancy, and in regard to its general consumption, as Lord Dawson, the president of the Royal College of Physicians stated in a letter to *The Times* on May 1, "within the medical profession there is for pasteurisation a consensus of opinion the strength of which is perhaps unfamiliar to those occupied in the world of politics." At a recent meeting of Fellows at the Royal College of Physicians, a report on the question, emphasising such an opinion, and recommending the pasteurisation or boiling of milk before distribution, was passed without a dissentient voice.

Much attention has naturally been paid in the last year or two to the nutrition of children and the effect upon them of the economic difficulties in which large sections of the population find themselves. Systems of relief and welfare care are such that it has generally been claimed that no real malnutrition among children existed here. A recent report from Newcastle-on-Tyne, a large city in the north of England, is of interest in this connection. The investigation on which the report is based was carried out by Dr. J. C. Spence, with observations by J. A. Charles. Although not concerned with a very large number of children, the investigation appears to have been carried out very thoroughly. Three groups of the poorest class children, numbering 125, between the ages of one and five years, and belonging in 113 instances to families where the mainstay was unemployed, were subjected to medical examination and a scrutiny of home conditions. A control series consisting of the same number and age groups of children of the professional and well-to-do commercial class were similarly investigated. The conclusion was drawn that, since the general occurrence of physical unfitness was found to be much less frequent among the well-to-do, this unfitness is related to diet and housing, and that it is to a large extent preventable. More care for the preschool child of the depressed industrial classes seems to be highly desirable.

An event of especial interest is the recent election of the paediatrician, Dr. Helen Mackay, to the Fellowship of the Royal College of Physicians. Dr. Mackay's work, especially upon nutritional anaemia, is known wherever paediatrics is studied, and we must congratulate her upon the honour of being the first woman ever to receive the Fellowship since the foundation of the College, four hundred years ago.

KENNETH TALLERMAN, M.D.

Comments

IT IS difficult to restrain from the use of superlatives in commenting upon the Fourth Annual Meeting of the Academy at Cleveland last month. To begin with 270 members, or approximately 40 per cent of Academy membership, were registered, as well as 39 guests. It was the largest group of pediatricians ever gathered together in the history of American pediatrics. Any doubt that might still have existed as to the need and place for the Academy, or in the interest of its members, was definitely dispelled by the Cleveland meeting. The program arranged by the executive committee was a decided improvement over the previous annual meetings, and the arrangements by those in charge were so excellent that the complicated program ran smoothly and no one had the feeling of a crowd.

The subjects of the ten Round Table discussions were so varied that every member present was able to find at least two subjects in which he had a particular interest. The second group, the repetition, was even better attended than the first, but imposed a lot of hard work on the leaders and their assistants. A change in the general business meeting was a decided improvement. Instead of consuming two hours in the reading of committee reports, each member on registration was given mimeographed copies of the various committee reports, and only such matters as required action came up on the floor of the meeting. The most important Academy action was a change dropping Region V and combining the Canadian provinces with Regions I, III, and IV. Canadian members from the eastern provinces now belong to Region I, and those from the far western ones, to Region IV.

A new feature of the annual meeting was the introduction of two Panel discussions, one on "Dental Caries" and the other on "Ductless Glands." Both were extremely interesting and most favorably commented upon. The chief criticism was the exhausting length of this session, over four hours, as one "Panel" followed directly after the other. We offer the suggestion that another year a regrouping be made; one Panel discussion to be combined in a session with the Presidential address and the essay of the guest speaker, and the other Panel discussion in a session with the business meeting.

Many factors tended to make the meeting a success. In addition to the program, excellent weather, pleasant physical surroundings, and a good hotel with efficient and courteous management played a part. Perhaps the most important of all, however, was the careful painstaking preliminary work of the Secretary's office which handled a complicated program without a hitch.

Complete reports of the various Round Table and Panel discussions will appear in succeeding numbers of the Journal. The address of the retiring president, Dr. Ruhräh, appeared in the June issue.